DOCUMENT RESUME

ED 431 083 CE 078 734

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TITLE	Farm Management and Leadership. Numeracy. Level 1. Level 2. Level 3. Support Materials for Agricultural Training.
INSTITUTION	National Languages and Literacy Inst., Melbourne (Australia).
SPONS AGENCY	Australian Dept. of Employment, Education, Training and Youth Affairs, Canberra.
PUB DATE	1998-00-00
NOTE	117p.; For related documents, see CE 078 731-738. An initiative of the Victorian Farmers Federation and Primary Skills Victoria.
AVAILABLE FROM	Language Australia National Resource Centre, GPO Box 372F, Melbourne, Victoria 3001, Australia; e-mail: lanrc@la.ames.vic.edu.au
PUB TYPE	Guides - Classroom - Learner (051)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	Adult Education; Agribusiness; *Agricultural Education; Agronomy; Calculators; Comparative Analysis; Cost Effectiveness; *Costs; Decimal Fractions; Developed Nations; Expenditures; Foreign Countries; *Income; Instructional Materials; Land Use; Learning Activities; Mathematics Skills; *Measurement; *Numeracy; Percentage; Postsecondary Education; Secondary Education; Vocational Education; Volume (Mathematics)
IDENTIFIERS	*Australia (Victoria)

ABSTRACT

This publication contains the three numeracy units of the three levels of Support Materials for Agricultural Training (SMAT) in farm management and leadership: Level 1 (starting), 2 (continuing), and 3 (completing). The units are designed to help the learner improve his or her numeracy skills needed to deal with farm management. SMAT materials can be used by the individual, with a mentor, or in a group or class. An introduction describes how to use the materials, types of activities, and materials needed. Each level contains agriculture-related mathematics activities. Model answers are provided. Topics covered in Level 1 are as follows: calculator use; invoices and payment advice sheets; percentage and decimals; and measuring length, area, and perimeter. Topics covered in Level 2 are budgets, costs, and comparing costs to income. Topics covered in Level 3 are measuring and volume. (YLB)

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ED 431 083

Farm Management and Leadership

Numeracy
Level 1

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Support Materials for Agricultural Training

FL 024 734

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Acknowledgments

These units were developed as an initiative of the Victorian Farmers Federation and Primary Skills Victoria. They have been written and prepared by Kangan Batman TAFE.

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Published and distributed by:
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GPO Box 372F, Melbourne Victoria 3001
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Funded under the Workplace English Language and Literacy Programme by the Commonwealth through the Department of Employment, Education, Training and Youth Affairs.

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Introduction

Welcome to this unit of the SMAT materials, *Farm Management and Leadership 1 - Numeracy.*

SMAT stands for Support Materials for Agricultural Training. SMAT will help you improve your written and spoken communication skills and your numeracy skills, so you can succeed at training programs or communicate more successfully in your workplace.

Where this fits

SMAT has four topics: *Agricultural Production, Farmers as Employers, Farm Management and Leadership* and *Occupational Health and Safety.*

This unit is Level 1 of *Farm Management and Leadership - Numeracy.* There are three units of *Farm Management and Leadership - Numeracy.* Level 1 (starting), 2 (continuing) and 3 (completing). Each unit has two parts: Communication Skills and Numeracy.

After you finish this unit, you could try the other units at the same level: *Agricultural Production 1 - Numeracy, Farmers as Employers 1 - Numeracy, Occupational Health and Safety 1 - Numeracy.*

Then you could try the units at a higher level.

You do not have to complete every unit in SMAT. It is up to you to choose the most useful parts and work through them.

How to use these materials

You can use the SMAT materials by yourself, with someone to help you, or in a group or class. It is hard to work by yourself, so it is a good idea to have someone who can give you advice and feedback (a mentor). This person could be a trainer from a college or community centre, a relative, a neighbour or a friend.

The unit is written so you can start at the beginning and work through it. Or if you like you can choose parts of the unit and only do those parts. Spend more time on the parts which are most useful for you. If something is not useful, you can skip it.

There is no certificate to go with the SMAT materials. But SMAT helps you improve your skills so you can do other courses and get other certificates. For example: Farm$mart, Rural Business Management, and courses run by the Department of Natural Resources and Environment. You will also find that working through SMAT improves the communication and numeracy skills that you need in your working life.

Outcomes

After you finish the SMAT materials you will be able to communicate more effectively in speech and writing and use numeracy skills more effectively. You will be able to use the calculator to find percentage and calculate using the memory keys.

How long should I spend?

This depends on you. The amount of time will be different if you are working by yourself or in a group, with a mentor or without, and if you do all the activities or not. Take enough time to do all the activities that are relevant to you, to a standard high enough to satisfy you.

Activities

Each unit has a number of activities for you to do. In the communications units there are four types of activities:

- key word activities
- reading activities
- writing activities

- spoken communication activities.

In the numeracy units there are numeracy activities.

Sometimes you can write answers to these activities in the book. Sometimes it is better to write them in a notebook. Sometimes for the spoken communication activities you will need to go and speak to some other people.

In some places there are also practice writing and practice reading activities. These are extra activities. You can choose to do them if you think you want extra practice in something.

Most of the activities have model answers in the back of the book. You can also ask your mentor to check your answers.

What you need

Before you start, make sure you have the following:

- a notebook (A4 size is best)
- pens, pencils, highlighter pens
- a file or folder to keep extra papers.

Assessment

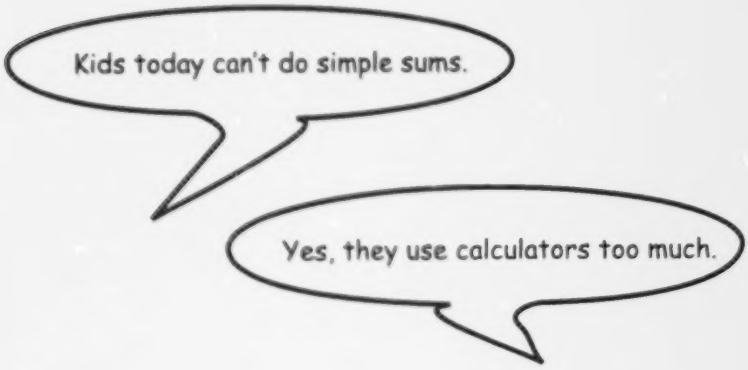
There is no formal assessment for SMAT. But it is a good idea to have a mentor look at what you have done. That way you can decide together what you have learned and what you need to improve.

Remember, the SMAT materials are a resource for you to use to improve your skills. It is up to you how you use them and how much of them you use.

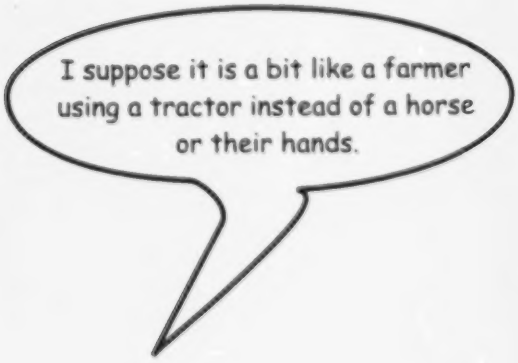
8

Calculator use

People often think using calculators is cheating. They think that calculators stop you from thinking for yourself.



Calculators are only a tool that makes the calculation easier and quicker but a calculator cannot do your thinking for you.



Calculators are a useful tool. They can be used to:

- do difficult calculations quickly and accurately
- check estimates and calculations you have done in your head.

You can buy all sorts of calculators. There are scientific, graphical and statistical calculators. But for most everyday jobs, a basic calculator is all you need. In this unit we will be using a basic calculator.

A basic calculator looks something like this:

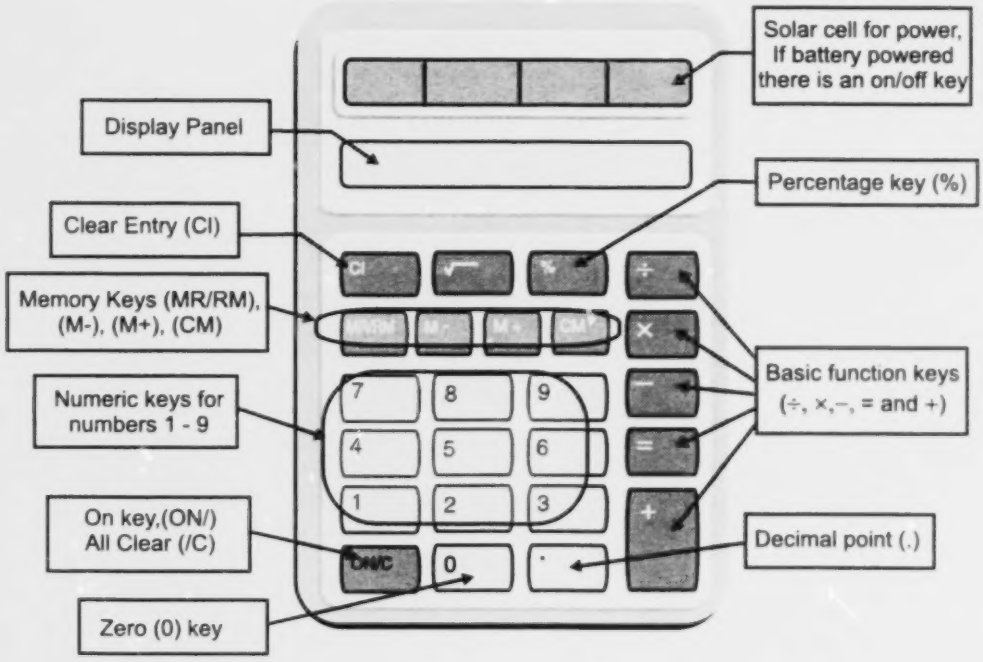

Solar cell for power, If battery powered there is an on/off key
Display Panel
Percentage key (%)
Clear Entry (CI)
Memory Keys (MR/RM), (M-), (M+), (CM)
Basic function keys (÷, ×,–, = and +)
Numeric keys for numbers 1 - 9
On key,(ON/) All Clear (/C)
Decimal point (.)
Zero (0) key

Figure 1: Basic calculator

Reproduced with permission from Understanding Farm Chemical Labels, *published by The Workplace Language Unit, Swinburne University, Melbourne 1996.*

Does your calculator look like this one?

It is not important that your calculator be exactly the same as the one shown here. It will have the same functions.

If you have an instruction booklet for your calculator, take time to read it.

Let's look at the special keys on the calculator.

10

Clear keys

There are two clear keys.

- One of them is the "All clear" key.

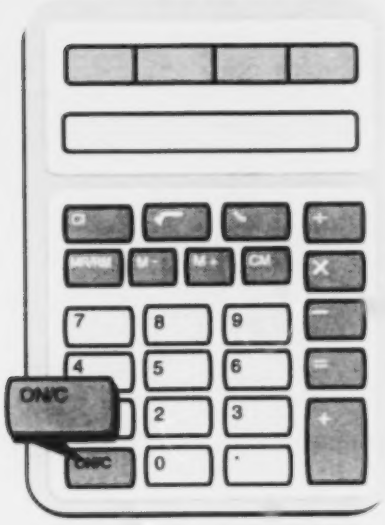


Figure 2: "All clear" key

This key will clear all numbers entered. This function is usually on the same key as "ON". On the calculator in the picture this is "C". On some calculators this key may be called AC/ON ("All Clear"/"On")

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- The other is the "Clear entry" key.

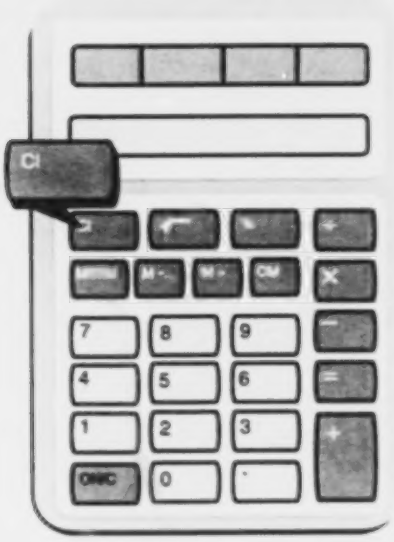

Figure 3: "Clear entry" key

This key will clear the last number you entered. On the calculator in the picture, this is "CI".

On some calculators the keys may be marked differently. You will need to check your own calculator.

Let's practise using these keys. Try keying in the following calculation:

On the calculator, key in: 12 + 15 CI 18 + 25 =

The display screen will show: 55

Now try the same calculation but using the other clear key:

On the calculator, key in: 12 + 15 ON/C 18 + 25 =

The display screen will show: 43

- Why did you get two different answers?
- What is the difference between the two clear keys?
- Why is this useful?
- When do you use the two different keys?

There are two different answers because the clear buttons do different functions.

The Cl key cleared the last entry. When you used this key it cleared only the 15 because it was the last entry. 12 was added to 18 then to 25.

The C key cleared all numbers entered. Both the 12 and the 15 were cleared. 18 was added to 25.

The Cl key is very useful. It means that you do not have to start a calculation from the beginning again if you make a mistake. You can clear the mistake and continue with the calculation. This is very handy if you enter a long list of numbers and then put in a wrong number.

Percentage key

We will now look at doing percentage calculations on the calculator.

Here are some examples of how the percentage button works:

To find what percentage:

Margaret and David own a sheep farm. Each year they hire a team to shear the sheep. They need to know what percentage of the total shearing costs involved in shearing are from the shearers. The shearers cost $9446 out of total costs of $21 842.

On the calculator, key in: 9446 ÷ 21842%

The display screen will show: 43.2470

So the shearers costs are 43% of total shearing costs.

To find the percentage of:

$90 million is spent on eggs each year in Australia. 6% of this is for free range eggs. How much is spent on free range eggs each year?

On the calculator, key in: 90 x 6%

The display screen will show: 5.4

So $5.4 million dollars a year is spent on free range eggs.

To find a percentage increase or mark up:

A new Holland harvester cost $242 293 in 1996. It has gone up 2.3% in 1997. What is the new price?

On the calculator, key in: 242293 + 2.3%
(Check your own calculator instructions. Your calculator may do this operation by keying in: 242293 x 2.3%+)

The display screen will show: 247865.73

A new Holland harvester was $247 865.73 in 1997.

To find a percentage decrease or mark down:

The Australian wheat board deducts 2.9% in levies from payments. Colin is paid $3604.54 minus the levies. How much does Colin receive?

On the calculator, key in: 3604.54 - 2.9%
(Check your own calculator instructions. Your calculator may do this operation by keying in: 3604.54 x 2.9%-)

The display screen will show: 3500.0084

Colin will receive $3500.01 for the wheat.

Note that the equals key is not used in these calculations.

Let's try some similar problems.

Activity 1

1. In the Western District of Victoria during September 1996 there was a 150% increase in the number of lamb deaths due to wet and windy weather. If the normal number of deaths is 3500, how many lambs died in September 1996?

2. 36% of 920 farmers surveyed said they suffered from ill effects from using chemicals. How many farmers is this?

3. Triple Superphosphate was $365. It is now $5 less. What percentage decrease is this?

4. Farmers can expect an increase in costs of 0.5% this financial year. If the operating costs of a farm were $126 638 last financial year, what will they be this year?

5. Machine repairs are 5% of the operating costs. From your answer to question 4 find the machine costs for this year.

6. 9% of the 127 000 bales of wool offered for sale at auction were passed in. How many bales were passed in?

7. Flavoured milk sales have increased by 36% from 1991 - 1992 to 1995 - 1996. 19 million litres of flavoured milk was sold in 1991 - 1992. How many litres were sold in 1995 - 1996?

Memory keys

Memory keys store the number on the display screen so you can use it later.

There are a number of memory keys. They are:

- M+ stores a number in memory or adds the number on the display screen to the number in memory
- M- subtracts the number on the display screen from the number in memory
- RM/MR recalls the number from memory and shows it on the display screen
- CM clears the memory.

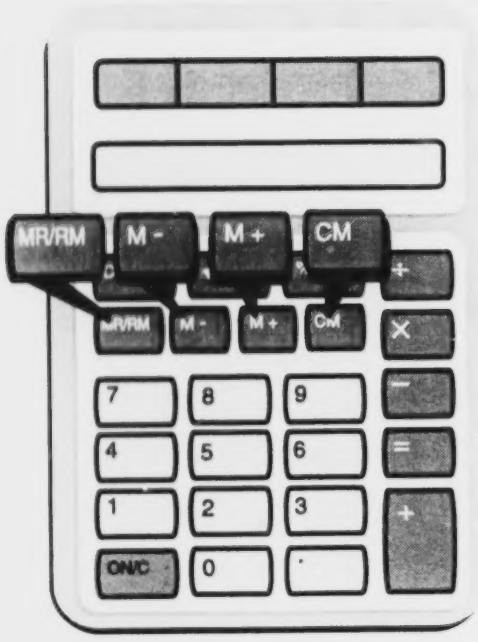

Figure 4: Memory keys

The memory key can be used to do difficult calculations. Let's use the memory key.

A farmer produced 27.24 tonnes of canola and 65.74 tonnes of wheat. She wants to work out the total payment she will receive from the wheat board. The canola is sold for $337.90 per tonne, wheat is sold for $188.15 per tonne.

To work this out she needs to multiply the number of tonnes by the price per tonne. She does the canola first.

Canola

On the calculator, key in: 27.24 x 337.90 = M+

The display screen will show: 9204.396

The amount of payment for canola is now stored in the memory. She now does the wheat calculation.

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Wheat

On the calculator, key in: 65.74 x 88.15 = M+

The display screen will show: 5794.981

The wheat payment has been added to the canola payment in memory.

Total Payment

To find out the total payment you need to display the number in memory.

Press the RM key.

The display screen will show: 14999.377

The farmer will receive $14 999.38 for the two crops.

Activity 2

John and Marjorie Spencer fill out an application for interest subsidy. On the form they are required to work out the production and cost for this year and the expected cost for next year.

Figure 5: Filling out an application for interest subsidy

This is the section of the form they have filled out . To find the value, John and Marjorie need to multiply the amount sold by the unit price. So 80 tonnes were sold and the unit price is $105. These two numbers are multiplied together. The first one has been done for you.

On the calculator key in: 80 x 105 =

The display screen will show: 8400

Use your calculator to fill in the missing values.

FARM PROGRAM – LAST YEAR

Month/Year End 30 / 6 / 96	Production			Sales		
Details of Production eg. Butterfat, Wool 23 Micron, Oats, Wheat	**Area Used ha.** *(if applic)*	**No. of Head** *(if applic)*	**Amount Produced** *No./Tonnes/Kg*	**No. or Amount Sold**	**Unit Price**	**Value $**
Oats	*100*		*120*	*80*	*105*	*8400*
Triticale	*246*		*250*	*220*	*140*	
Wheat	*720*		*1190*	*1146*	*171*	
Cattle	*1100*	*74*		*80*	*512.50*	
					TOTAL PRODUCE SOLD	

FARM PROGRAM – THIS YEAR

Month/Year End 30 / 6 / 97	Production			Sales		
Details of Production eg. Butterfat, Wool 23 Micron, Oats, Wheat	**Area Used ha.** *(if applic)*	**No. of Head** *(if applic)*	**Amount Produced** *No./Tonnes/Kg*	**No. or Amount Sold**	**Unit Price**	**Value $**
Oats	*120*		*140*	*120*	*110*	
Triticale	*300*		*330*	*296*	*150*	
Wheat	*750*		*1250*	*1190*	*170*	
Cattle		*80*		*78*	*500*	
					TOTAL PRODUCE SOLD	

FARM PROGRAM – NEXT YEAR

Month/Year End 30 / 6 / 98	Production			Sales		
Details of Production eg. Butterfat, Wool 23 Micron, Oats, Wheat	**Area Used ha.** *(if applic)*	**No. of Head** *(if applic)*	**Amount Produced** *No./Tonnes/Kg*	**No. or Amount Sold**	**Unit Price**	**Value $**
Oats	*140*		*170*	*145*	*110*	
Triticale	*320*		*400*	*370*	*160*	
Wheat	*800*		*1300*	*1240*	*170*	
Cattle		*100*		*97*	*500*	
					TOTAL PRODUCE SOLD	

Where production/returns less than normal, specify cause and effect. For affected crops include quantities and gradings.

Next years production and prices only a forecast.

Figure 6: Farm program

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Estimating

As we said before, calculators cannot do your thinking for you!

It is good to have a rough idea of the answer before you start using the calculator. You can then check if the answer on the display screen looks okay. This is called estimating.

You can estimate on paper or in your head. For example, last year John and Marjorie sold 80 tonnes of oats for $105.00 per tonne. To estimate the amount of money received for the oats you would multipy 80 by $100. This means the answer is about $8000.

Skills: Using a calculator

Follow these steps when using a calculator to minimise the mistakes.

1. Work out what the problem is asking then estimate an answer.
2. Work out which operation (+, -, x, ÷)you need to use.
3. Do the calculation on the calculator.
4. Check that the answer on the calculator is similar to your estimate. If it isn't, go back and recalculate the problem checking that you have keyed it in properly.

One of the most common mistakes made on the calculator is not putting in the decimal point or putting in a decimal point for a comma. There is no comma on the calculator.

For example, the number 3,456 is keyed in as 3456 with no spaces, commas or decimal points.

When you write large numbers, a space is left between every three digits like this: 1 352 670. But there are no spaces on the calculator.

Here are some worked examples. Follow the examples and use your calculator to check that you get the same results.

Colin received a payment of $9204.40 for wool. From this, two levies were deducted of $90.33 and $9.20. How much was the final payment to the farmer?

1. Colin estimates the total deductions to be about $100. The payment is about $9200. $9200 less $100 is $9100. The farmer should get about $9100.

2. The two deductions are added then taken away from the payment.

3. On the calculator, key in: 90.33 + 9.20 = M+ 9204.40 - RM =

   The display screen shows: 9104.87

4. This answer is close to the estimate so Colin will assume it is correct.

Here is another worked example.

The Australian Wheat Board paid an advance of $83.82 per tonne of wheat. If Marj sold 14.36 tonnes, how much would she be paid?

1. Marj estimated that $83.82 is about $80 and 14.36 is about 15. 15 lots of 80 is 1200.

2. "Lots of" means multiply so this is a times (x) sum.

3. On the calculator, key in: 83.82 x 14.36 =

   The display screen will show: 1203.6552

4. Marj will be paid $1203.66. This answer is close to her estimate so she will accept it.

Activity 3

Try these examples. This is to help you with estimating.

Make an estimate of the answer in your head or on paper, then circle the correct answer. Do not use a calculator for this activity.

1. An employee earns $473 per week. She has $94.50 in tax taken out. How much does she take home each week?

   $178.50 $378.50 $227.50 $37 850 $3785.00

2. Bonlac collected 34 210 litres of milk, 34 890 litres and 36 340 litres for three 10 day periods in the year. What was the total amount collected over the 30 days?

   105 440 1 054 400 10 544 1054

3. Australians eat 34.2 kg of beef per person each year. If there are 18 million (18 000 000) people in Australia, how many kilograms of beef are eaten each year?

   6156 million 61 560 million 615 million

4. A free-range chook farmer has 750 birds on one hectare (10 000 sq m). How many square metres is this for each hen?

   13.333 1.333 0.133 133.33 0.013

Invoices and payment advice sheets

In farm management, it is very important to keep accurate records of buying and selling. If you are on top of the figures it helps see where the money is going. It also helps when you talk to banks and other financial organisations.

payment advice	*A payment advice form is a form that shows how much product you sold, how much was paid for it and what deductions were made*
invoice	*An invoice is a form that shows you what you have bought and how much it costs*

Use the calculator to check if the invoices and payment advice sheets following are correct.

Activity 4

1. Helen and Colin Jamieson receive the following payment advice form from the Australian Wheat Board.

AWB LIMITED

VICTORIAN STATE OFFICE 528 Lonsdale Street, Melbourne VIC 3000

GROWER ENQUIRIES
1800 05 4433

Payment Advice

1997-98 Season Payment

For Enquiries Please Quote This Payee Number

Payment Date
1st Dec 1997

Total Amount Paid to Your Account
$62736.68

Payment Method

Payment Summary

	Credit $	Amount $
Wheat - Normal Payment Pool	64665.34	
Total	64665.34	64665.34CR

Levies/Interest

	Debit $	
Vit Levy % - Wheat	91.41	
W. I. F. Levy	1218.72	
Research Levy	609.37	
N. R. S. Levy	9.16	
Total	1928.66	1928.66DR

Tonnage Summary For This Payment

Registration No.	Grain	Grade	Your Share Tonnes	Business Activity/ Pool *	Season
	WHT	AGP1	21.78	P3P8	97/98
	WHT	APW	347.34	P3P8	97/98
	WHT	ASW	157.28	P3P8	97/98

* T prefix denotes grain acquired/received by AWB LIMITED as agent for AWB (AUSTRALIA) LIMITED (A.C.N. 081 890 502)
P prefix denotes grain acquired/received by AWB LIMITED as agent for AWB (INTERNATIONAL) LIMITED (A.C.N. 081 890 413)

Figure 7: Harvest Payment Advice

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Look at the sheet and answer these questions:

- When was the payment made?

- How much were Helen and Colin paid?

- How much was taken out in levies?

- How many tonnes were sold?

- What grades of wheat were sold?

Some of the numbers have been left off this advice sheet. Use your calculator to find the missing values then fill them in on the form.

2. Colin received the following invoice.

Head Office:
400-410 BATTLER COURT, BALLARAT, VIC 3623
P.O. BOX 000A

ACCOUNT SALES of *Colin Davis* ..... sold by order

on account of .....

Mc Farland & Sons
PTY. LTD.
Station Agents.
BALLARAT

16 May 19 *90*
As Agents for the Vendor

10	*Merino Ewes @ $58*					
50	*Lambs @ $50*				*$2500*	-
	CHARGES: To Commission *10%*				*$308*	-
	To Municipal Fees					
	To Freight or Cartage					
	To Chemical Residue Levy					
	To Cattle Compensation Duty					
	To N.F.F.					
	To Weighing Fee					
	To Advertising					
	To Feeding and Attention & Droving					
	E. & O.E.					
	Cheque herewith					

Figure 8: Account Sales of ewes and lambs

- What did he buy?

.....

- How much did he pay for each lamb?

.....

27

- What was the total cost of the sheep and lambs?

- How much commission did the stock and land agent get?

- Work out the missing values and fill them in.

Percentage and decimals

We looked at how to do percentages on the calculator before. This is not the only way to calculate with percentages. Sometimes it is easier to change a percentage to a decimal and use the decimal to calculate with.

Let's look at converting percentages to decimals.

10% means 10 out of 100 or 10 ÷ 100. If you work this out on the calculator you will get 0.1

On the calculator, key in: 10 ÷ 100=

The display screen will show: 0.1

So 10% is the same as 0.1

Activity 5

1. Work out these percentages as decimals

   12% = _____

   67% = _____

   84% = _____

   15% = _____

   56.6% = _____

   123% = _____

2. Can you see a pattern?

Changing percentages to decimals

Can you find the decimal equivalent of the percentage without using a calculator?

There is a quick way of finding the decimal equivalent. When we divide by 100, the decimal point in a number is moved two numbers to the left (because there are two zeros in 100).

If there is no decimal point shown in a number, it is placed at the end of the number.

For example:

23% can be written as 23.%. To change it to a decimal the point is moved two numbers to the left as shown:

$$23.\,\% = 0.23$$

We put a zero in front of the point so it can be seen where the point is.

Similarly 245% can be changed by putting a decimal point at the end of the number then moving the point two places to the left.

$$245.\,\% = 2.45$$

If the percentage already has a point then that point is moved two places to the left.

Look at this example:

$$23.6\,\% = 0.236$$

Here is a table of some of the common decimal percentage equivalents.

Percentage	Decimal
10%	0.1
20%	0.2
25%	0.25
33%	0.33
50%	0.5
67%	0.67
75%	0.75
100%	1.00

We can now use this method to calculate percentages.

The Victorian Dairy Industries Association (VDIA) take 17.89% of Karen's milk production. If Karen produces 80 980 litres of milk in a month, how much of it goes to VDIA?

To find out how much will go to VDIA first work out 17.89% as a decimal.

17.89% is the same as 0.1789.

Now multiply 0.1789 by 80 980 (the litres of milk produced).

On the calculator, key in : 0.1789 x 80980 =

The display screen will show: 14487.322

To make the calculations easier, Karen's litres will be rounded off to 14 490.

14 490 litres of Karen's milk will go to VDIA.

Here is another example.

Rollalog North Angus stud farm sells 150 heifers for $400 each. The stock and station agent takes 8% of the sale. How much does the stock and station agent get?

Let's work out how much the heifers will sell for first.

On the calculator, key in: 150 x 400 =

The display screen will show: 60 000

150 heifers at $400 each is $60 000.

Now we calculate the percentage the stock and station agent gets. She receives 8% or 0.08 of the $60 000.

On the calculator key in: 0.08 x 60000 =

The display screen will show: 4800

So the stock and station agent gets $4800.

Activity 6

It is always worth checking bills and invoices. Maybe there are some mistakes.

Now check the following invoices and circle any mistakes.

Write the correct answers.

Invoice A

Spot On Seed Farm

Postal Address
P.O. BOX 9999, GIPPSLAND, VIC 3555
BOX RD, GIPPSLAND
Telephone: 5555 1111 Fax: 5566 1112
Specialising in Vegetables, Herbs and Flower Seeds

T & M Smythe
WSD 38
Kilmore, VIC

DATE	Cust Code	SALES TAX No.	YOUR REFERENCE	DEL DOCKET	DELIVERY INSTRUCTIONS	INVOICE No.
28/02/90	CLAFVD 00		P			37367

PRODUCT CODE	DESCRIPTION	QUANTITY	UNIT	PRICE	DISCOUNT%	VALUE	S/TAX
						B/FWD 43.25	
2062	Radish - Salad Mix	1	pkt	1.30		1.30	
4600	Green Crop - LUPINS	500	g	9.20/1000		4.60	
4603	Green Crop - RYECORN	500	ea	9.20/1000		6.60	
1990	1990/91 CATALOGUE DUE JUNE '90	1	ea	1.00		1.00	
	Post/Han					2.50	
	PAID C /C					59.25-	
	THANK YOU FOR YOUR ORDER						
					$	0.00	

Invoice B

Under Franchise To

Franco's Seed Services

Subject No. | CLIENT DETAILS Name in BLOCK LETTERS F. JONES | Phone 03 9199 4026 | HUNDRED/SHIRE NAME | DATE

Client Code | Address JONES FARM, UTOPIA | Postcode 3949 | M No. 22004

Grain	Treated	Untreated	Screenings	Tonnes	Total Bags	Rate	Total	Baytan Kgs	Vitavax Kgs	Raxil Kgs	Sibutol Kgs	P Pickel Ltrs	Price	Total
WHEAT	160		14	174		1.15			9.4				28.48	287 71
						"							"	
BARLEY						"							"	
						"							"	
OATS						"							"	
PEAS						"							"	
LUPINS						"							"	
TRI-RYE						"							"	
OTHER						"							"	
TOTAL							200 00							

Grain	Hrs		Screenings	Tonnes	Total Bags	Rate	Total	Baytan Kgs	Vitavax Kgs	Raxil Kgs	Sibutol Kgs	P Pickel Ltrs	Price	Total
						"							"	
						"							"	

Invoice C

Rumer PASTORAL

CLEARING SALE CASH INVOICE

Buyers number
(Ex Buyers Reg. Card)....51.....

D. ROBERTS
HILL TIP FARM
WARRACKNABEAL

BRANCH.....

BOUGHT AT.....*MCDUFF'S*.....

DATE OF INV.....*SALE*.....

	DESCRIPTION	AMOUNT
	LOT 5 10 X HERFORD COWS @ $440	*$4400*
	LOT 22 20 X HEIFERS @ $300	*$600*
	TOTAL INVOICE	*$ 5000*

TERMS: - CASH CLIENT COPY

Invoice D

UNDER FRANCHISE TO

Cartman-Probe International

Subject No. ..... CLIENT DETAILS Name in BLOCK LETTERS F & R. JONES Phone ..... HUNDRED/SHIRE NAME ..... DATE 22/4/98

Client Code ..... Address P O BOX 001, W/BEAL Postcode 3393 ..... M Number 222738

Grain	Treated	Untreated	Screenings	Tonnes	Total Bags	Rate	Total	Baytan Kgs	Vitavax Kgs	Raxil Kgs	Sibutol Kgs	P' Pickel Ltrs	Price	Total
WHEAT						•							•	
						•							•	
BARLEY						•							•	
						•							•	
OATS						•							•	
PEAS						•							•	
LUPINS						•							•	
TRI-RYE						•							•	
OTHER *BEANS*		175	40		215	1.20							•	
TOTAL							268 00							

Grain	Hrs		Screenings	Tonnes	Total Bags	Rate	Total	Baytan Kgs	Vitavax Kgs	Raxil Kgs	Sibutol Kgs	P' Pickel Ltrs	Price	Total
						•							•	
						•							•	

GRADING	$	268 00
MARKET GRADING	$	
BASIC SERVICE	$	
NET AMOUNT PAYABLE ON DOCKET		268 00

Measuring length, area and perimeter

Farmers often need to measure lengths. Some of the things they need to find are:

- length of fencing
- building measurements
- distance from one place to another.

Can you think of any others?

Activity 7

Yvonne has problems when she moves her sheep from one paddock to another. The sheep from one paddock sometimes get mixed up with the sheep from the paddock she is driving them through. She wants to put a laneway between the paddocks so she can move her stock easily.

Here is a plan of the paddocks she wants to add a laneway to.

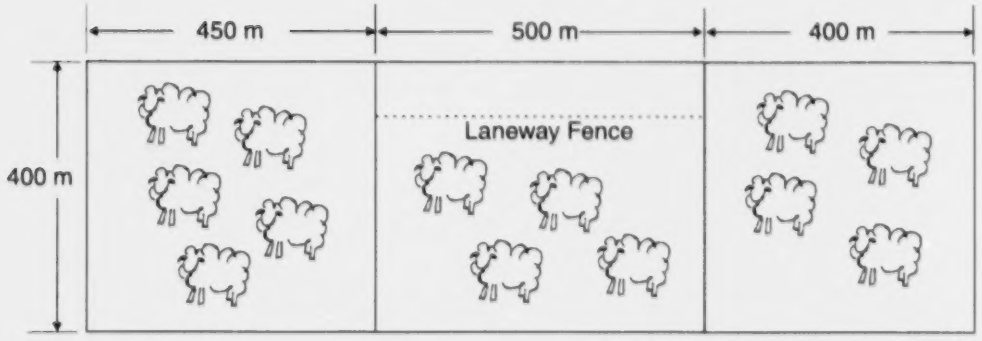


Figure 9: Plan of paddocks with laneway

1. How long will the laneway fence be?

2. If the fence has three strands of wire, how many metres of wire would she need?

3. How many posts does she need to put in if the posts are 3 metres apart?

Area and perimeter

In the above example, Yvonne needed to make one measurement. Farmers need to sometimes combine measurements. One common combination is of length and width. Length and width are used to find area and perimeter.

area and perimeter

area	*The amount of floor space or ground space that a shape takes up*
perimeter	*The distance around an object or shape*

Perimeter

The distance around an object or shape is called the perimeter. A fence goes around the perimeter of a paddock. The outside walls of a shearing shed go round the perimeter of the shed. To find the perimeter of straight sided objects, add together the lengths of the sides. For example this paddock is 300m long by 200m wide.

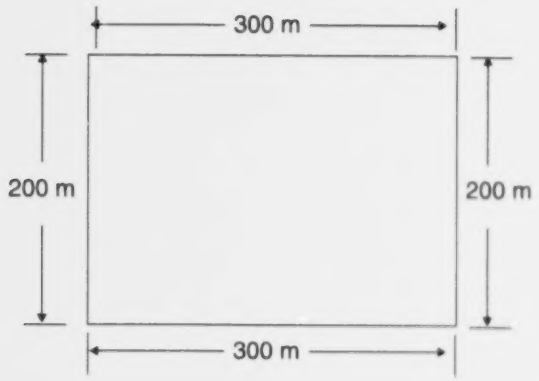


Figure 10: Square-shaped paddock

The perimeter is 300 + 200 + 300 + 200 which is 1000m.

On the calculator, key in: 300 + 200 + 300 + 200 =

The display screen will show: 1000

Here is a part of a plan of James's farm paddock. It is shaped like this.

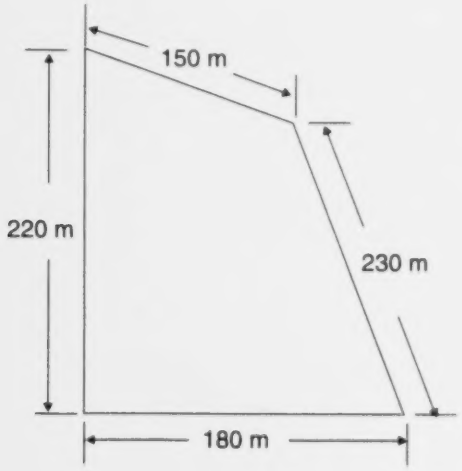


Figure 11: Non-square shaped paddock

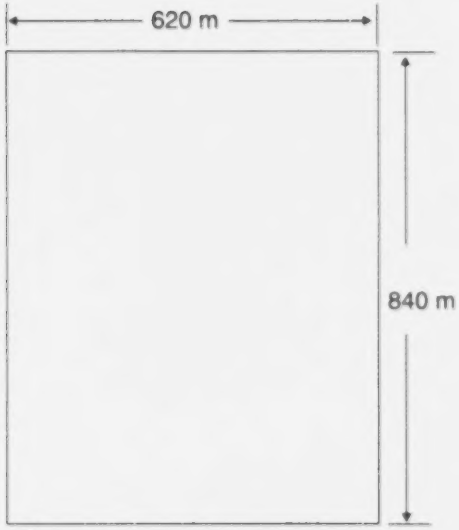
It has a perimeter of 150m + 230m + 180m + 220m. The perimeter of this paddock is found by adding theses.

On the calculator, key in: 150 + 230 + 180 + 220 =

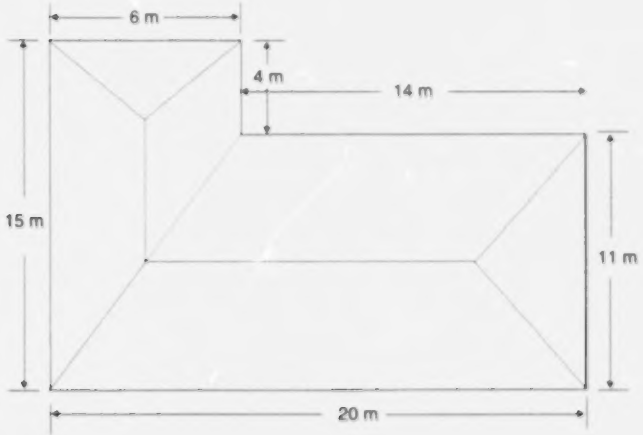
The display screen will show: 780

Activity 8

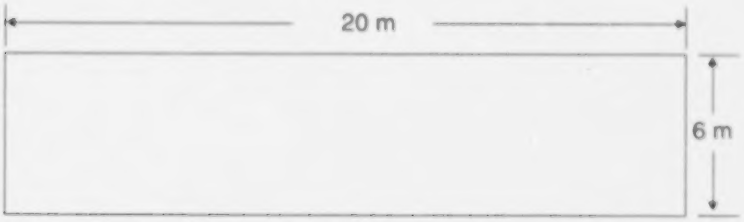
1. A paddock has the measurements as shown in the diagram below. How much wire would be needed to fence the paddock if three strands are used?



2. A house needs guttering placed around the edge of the roof. How many metres of guttering are needed to fix this house?



3. A shed needs a concrete floor laid. The floor has to be boxed in before the cement can be poured. Lengths of wood are used to box in the floor space. How many metres of timber will be needed to do the job?



Area

The area is the amount of floor space or ground space that a shape takes up. The area of a rectangle is found by multiplying the width by the length.

Area = length x width

A farmer plans to plant a windbreak across the front of the house. The windbreak will be 36 m by 12 m.

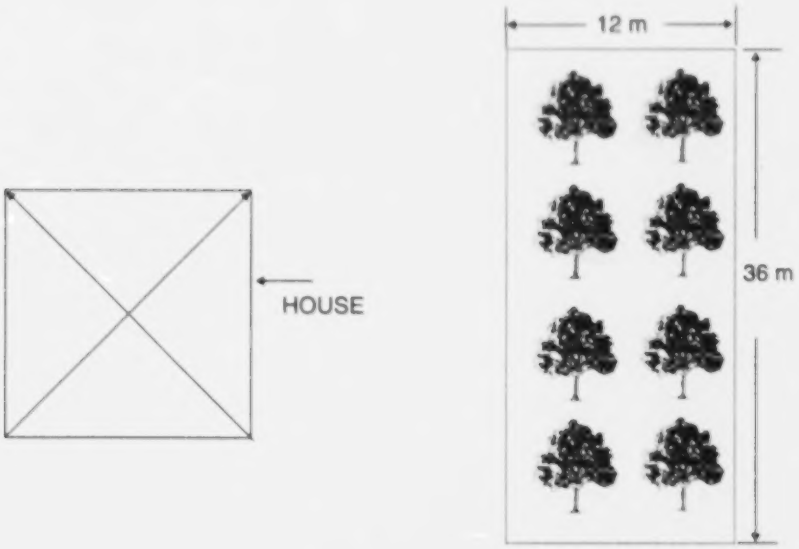


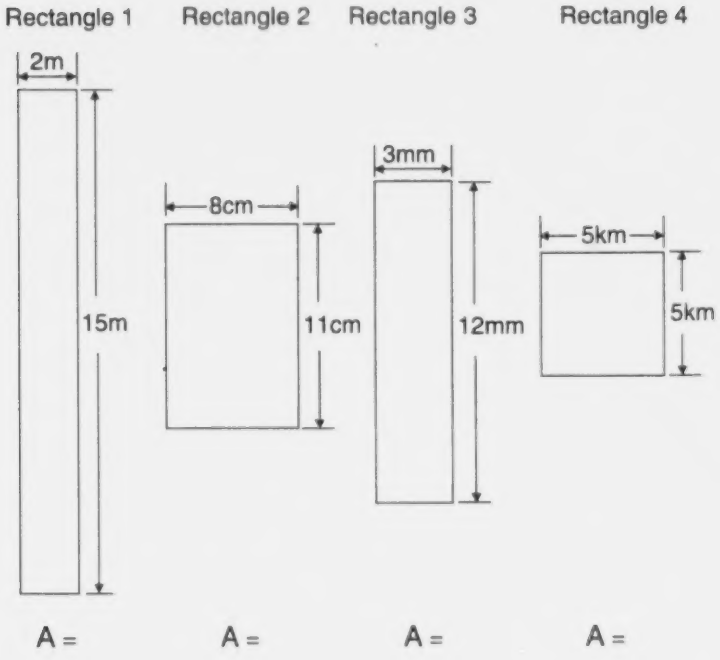
Figure 12: Plan of house and windbreak

What area will the windbreak cover?

The area covered by the windbreak is 12 x 36 which is 432 m.

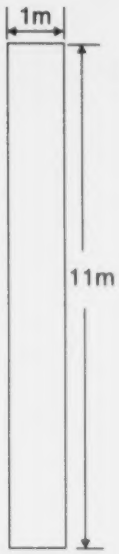
Activity 9

1. Find the area of the following rectangles.



2. Calculate the area and perimeter of each of these shapes.

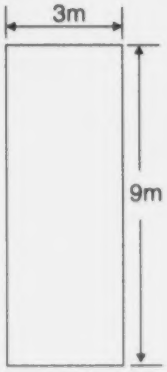
Rectangle 1



P =

A =

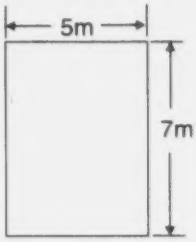
Rectangle 2



P =

A =

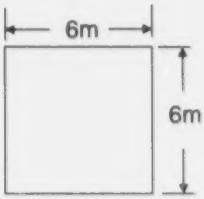
Rectangle 3



P =

A =

Rectangle 4



P =

A =

- Do they all have the same perimeter?

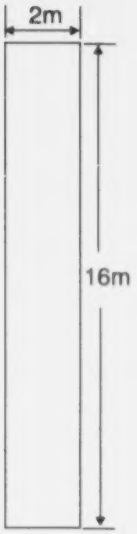
.....

- Which one has the biggest area?

.....

3. Try these shapes. Calculate the area and perimeter for each of these shapes.

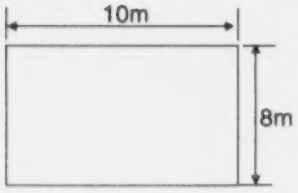
Shape 1



P =

A =

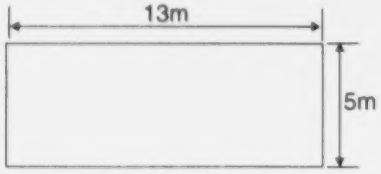
Shape 2



P =

A =

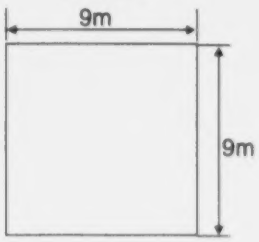
Shape 3



P =

A =

Shape 4



P =

A =

- Do these shapes all have the same perimeter?

- Which shape has the largest area?

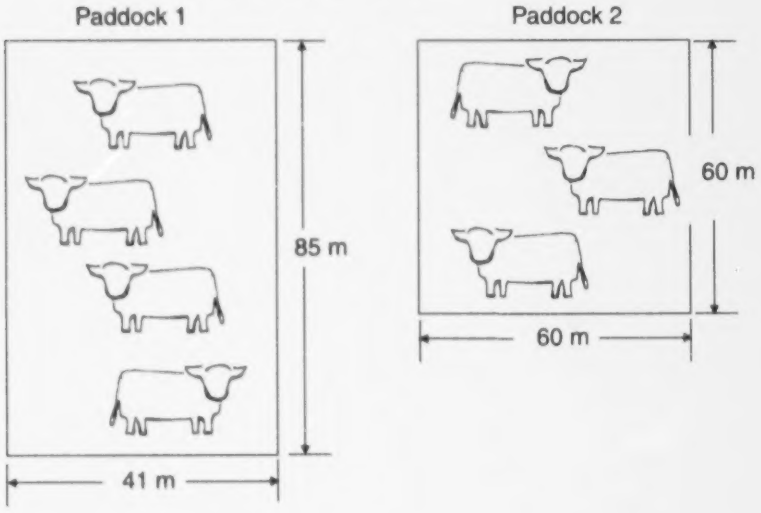
Using space well

A well laid out farm can save both time and money.

We can use this information about perimeter and area to plan the shapes of paddocks.

Activity 10

1. Nicky owns a dairy farm. She often needs to divide a paddock in half with temporary fencing. Temporary fencing is expensive so she designs her paddocks so that she does not have to use much temporary fencing. Look at the following two paddocks.



- Which way would you divide paddock 1 in half?

  Across ☐ Down ☐

- How much fencing would you use to divide it?

  .....

- Which way would you divide paddock 2 in half?

  Across ☐ Down ☐

- How much fencing would you use to divide it?

  .....

44

- Which paddock would use the shortest amount of temporary fencing?

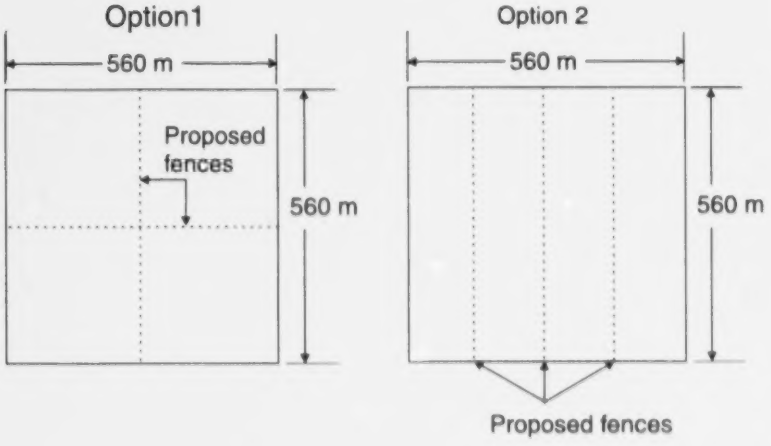
.....

- Fill in the missing word. Choose a word from these:

  wide narrow short

  Paddocks should be long and _____if you plan to divide them with temporary fencing often.

2. Michael is going to divide a large paddock into four smaller paddocks. He wants to use as little fencing as possible.



- How many metres of fencing would option 1 use?

.....

- How many metres of fencing would option 2 use?

.....

- Which option would Michael use?

.....

Model answers

Activity 1

Question 1

On the calculator, key in: 3500 + 150%

The display screen will show: 8750

8750 lambs died in September 1996 in the Western district of Victoria.

Question 2

On the calculator, key in: 920 x 36%

The display screen will show: 331.2

331 farmers suffered from ill effects from chemicals.

Question 3

On the calculator, key in: 5 + 365%

The display screen will show: 1.369863

Triple Superphoshate has decreased by 1.4%

Question 4

On the calculator, key in: 126638 + 0.5%

The display screen will show: 127271.19

The operating cost for the farm will be $127 271.

Question 5

On the calculator, key in: 127271 x 5%

The display screen will show: 6363.55

Machine repairs will be $6363.55

Question 6

On the calculator, key in: 127000 x 9%

The display screen will show: 11430

11 430 of the bales of wool will be passed in.

Question 7

On the calculator, key in: 19 + 36%

The display screen will show: 25.84

25.84 million litres of flavoured milk was sold in 1995/96.

Activity 2

On the calculator, key in: 80 x 105 = M+

The display screen will show: 8400

Then

On the calculator, key in: 220 x 140 = M+

The display screen will show: 30800

Then

On the calculator, key in: 1146 x 171 = M+

The display screen will show: 195966

Then

On the calculator, key in: 80 x 512.50 = M+

The display screen will show: 41000

Then

On the calculator, key in: MR

The display screen will show: 276166

Similarly the other two columns can be filled in.
Check your answers on the form below.

FARM PROGRAM – LAST YEAR

Month/Year End *30 / 6 / 96*	Production			Sales		
Details of Production eg. Butterfat, Wool 23 Micron, Oats, Wheat	**Area Used ha.** *(if applic).*	**No. of Head** *(if applic).*	**Amount Produced** *No./Tonnes/Kg*	**No. or Amount Sold**	**Unit Price**	**Value $**
Oats	*100*		*120*	*80*	*105*	*8400*
Triticale	*246*		*250*	*220*	*140*	*30800*
Wheat	*720*		*1190*	*1146*	*171*	*195966*
Cattle	*1100*	*74*		*80*	*512.50*	*41000*
					TOTAL PRODUCE SOLD	*276166*

FARM PROGRAM – THIS YEAR

Month/Year End *30 / 6 / 97*	Production			Sales		
Details of Production eg. Butterfat, Wool 23 Micron, Oats, Wheat	**Area Used ha.** *(if applic).*	**No. of Head** *(if applic).*	**Amount Produced** *No./Tonnes/Kg*	**No. or Amount Sold**	**Unit Price**	**Value $**
Oats	*120*		*140*	*120*	*110*	*13200*
Triticale	*300*		*330*	*296*	*150*	*44400*
Wheat	*750*		*1250*	*1190*	*170*	*202300*
Cattle		*80*		*78*	*500*	*39000*
					TOTAL PRODUCE SOLD	*298900*

FARM PROGRAM – NEXT YEAR

Month/Year End *30 / 6 / 98*	Production			Sales		
Details of Production eg. Butterfat, Wool 23 Micron, Oats, Wheat	**Area Used ha.** *(if applic).*	**No. of Head** *(if applic).*	**Amount Produced** *No./Tonnes/Kg*	**No. or Amount Sold**	**Unit Price**	**Value $**
Oats	*140*		*170*	*145*	*110*	*15950*
Triticale	*320*		*400*	*370*	*160*	*59200*
Wheat	*800*		*1300*	*1240*	*170*	*210800*
Cattle		*100*		*97*	*500*	*48500*
					TOTAL PRODUCE SOLD	*334450*

Where production/returns less than normal, specify cause and effect. For affected crops include quantities and gradings.

Next year's production and prices only a forecast.

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Activity 3

Question 1

$378.50

Question 2

105 440 litres of milk.

Question 3

615 million kilograms of beef.

Question 4

1.333 square metres per bird.

Activity 4

Question 1

- The payment was made on 1st December 1997.
- Helen and Colin were paid $62736.68
- $1928.66 was taken out in levies.
- On the calculator, key in: 21.78 + 347.34 + 157.28 =
  The display screen will show: 526.4
  526.4 tonnes were sold.
- The grades sold were AGPI, APW and ASW.

Question 2

- Colin bought Merino ewes and lambs.
- Colin paid $50 for each lamb.
- On the calculator, key in: 10 x 58 = M+
  The display screen will show: 580

  Then

  On the calculator, key in: 50 x 50 = M+
  The display screen will show: 2500

  Press the RM key.

  The screen will show: 3080

  The total cost was $3080.
- The stock and land agent got $308.

Activity 5

Question 1

- 0.12
- 0.67
- 0.84
- 0.15
- 0.566
- 1.23

50

Activity 6

Invoice A

Spot On Seed Farm

Postal Address:
P.O. BOX 9999, GIPPSLAND, VIC 3555
BOX RD, GIPPSLAND
Telephone: 5555 1111 Fax: 5555 1112
Specialising in Vegetables, Herbs and Flower Seeds

T & M Smythe
WSD 38
Kilmore, VIC

DATE	Cust Code	SALES TAX No	YOUR REFERENCE	DEL DOCKET	DELIVERY INSTRUCTIONS	INVOICE No
28/02/90	CLAFVD 00		P			37367

PRODUCT CODE	DESCRIPTION	QUANTITY	UNIT	PRICE	DISCOUNT%	VALUE	S/TAX
						B/FWD 43.25	
2062	Radish - Salad Mix	1	pkt	1.30		1.30	
4600	Green Crop - LUPINS	500	g	9.20/1000		4.60	
4603	Green Crop - RYECORN	500	ea	9.20/1000		6.60	
1990	1990/91 CATALOGUE DUE JUNE '90	1	ea	1.00		1.00	
	Post/Han					2.50	
	PAID C /C					59.25-	
	THANK YOU FOR YOUR ORDER						
					$	0.00	

4.60

Invoice B

Under Franchise To

Franco's Seed Services

Subject No. CLIENT DETAILS Name in BLOCK LETTERS F. JONES Phone 03 9199 4026 NUMBER/ENTIRE NAME DATE
Client Code Address JONES FARM, UTOPIA Postcode 3949 W No. 22004

Grain	Treated	Untreated	Screenings	Tonnes	Total Bags	Rate	Total	Baytan Kgs	Vitavax Kgs	Rami Kgs	Sibutol Kgs	P Picket Lts	Price	Total
WHEAT	160		14	174		1.15			9.4				28.48	267.71
						"							"	
BARLEY						"							"	
						"							"	
OATS						"							"	
PEAS						"							"	
LUPINS						"							"	
TRI RYE						"							"	
OTHER						"							"	
TOTAL							200.00							

200.10

267.71

Grain	Hrs		Screenings	Tonnes	Total Bags	Rate	Total	Baytan Kgs	Vitavax Kgs	Rami Kgs	Sibutol Kgs	P Picket Lts	Price	Total
						"							"	
						"							"	

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Invoice C

Rumer PASTORÁL

CLEARING SALE CASH INVOICE

Buyers number
(Ex Buyers Reg. Card) *51*

D. ROBERTS
HILL TIP FARM
WARRACKNABEAL

BRANCH.....

BOUGHT AT *MCDUFF'S*

DATE OF INV. *SALE*

	DESCRIPTION	AMOUNT
	LOT 5 10 X HERFORD COWS @ $440	*$4400*
	LOT 22 20 X HEIFERS @ $300	*$600*
	TOTAL INVOICE	*$ 5000*

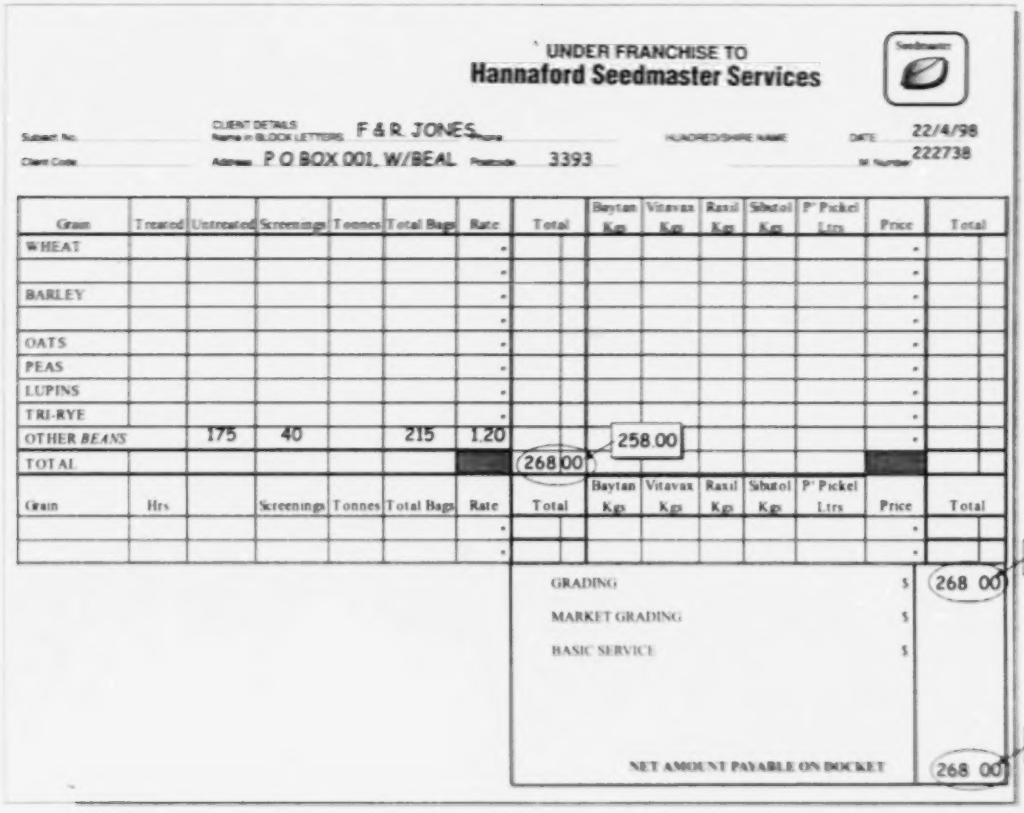
$6000

$10 400

TERMS - CASH CLIENT COPY

52

Invoice D



UNDER FRANCHISE TO
Hannaford Seedmaster Services

Subject No. | CLIENT DETAILS Name in BLOCK LETTERS: F & R. JONES | HUNDRED/SHIRE NAME | DATE: 22/4/98
Client Code | Address: P O BOX 001, W/BEAL | Postcode: 3393 | M Number: 222738

Grain	Treated	Untreated	Screenings	Tonnes	Total Bags	Rate	Total	Baytan Kgs	Vitavax Kgs	Raxil Kgs	Sibutol Kgs	P' Pickel Ltrs	Price	Total
WHEAT														
BARLEY														
OATS														
PEAS														
LUPINS														
TRI-RYE														
OTHER *BEANS*		175	40		215	1.20		258.00						
TOTAL							268.00							

Grain	Hrs		Screenings	Tonnes	Total Bags	Rate	Total	Baytan Kgs	Vitavax Kgs	Raxil Kgs	Sibutol Kgs	P' Pickel Ltrs	Price	Total

258.00

GRADING	$	268 00
MARKET GRADING	$	
BASIC SERVICE	$	
NET AMOUNT PAYABLE ON DOCKET		268 00

258.00

Activity 7

Question 1

The corridor fence should be 500 m long.

Question 2

On the calculator, key in: 500 x 3 =
The display screen will show: 1500
1500 metres of wire is needed.

Question 3

On the calculator, key in: 500 ÷ 3 =
The display screen will show: 166.666666
You will need 168 posts because this only includes one end post.

Activity 8

Question 1

On the calculator, key in: 620 + 840 + 620 + 840 =
The display screen will show: 2920

Then

On the calculator, key in: x 3 =
The display screen will show: 8760
8760 metres of wire is needed.

Question 2

On the calculator, key in: 6 + 4 + 14 + 11 + 20 + 15 =
The display screen will show: 70
70 metres of guttering is needed.

Question 3

On the calculator, key in: 20 + 6 + 20 + 6 =
The display screen will show: 52
52 metres of timber is needed.

Activity 9

Question 1

Rectange 1: A = 30 sq m

Rectangle 2: A = 88 sq cm

Rectangle 3: A = 36 sq mm

Rectangle 4: A = 25 sq km

Question 2

Rectangle 1: P = 24 m

A = 11 sq m

Rectangle 2: P = 24 m

A = 27 sq m

Rectangle 3: P = 24 m

A = 35 sq m

Rectangle 4: P = 24 m

A = 36 sq m

- Yes they all have the same perimeter.
- The square has the biggest area.

Question 3

Shape 1: P = 36 m

A = 32 sq m

Shape 2: P = 36 m

A = 80 sq m

Shape 3: P = 36 m

A = 65 sq m

Shape 4: P = 36 m

A = 81 sq m

- Yes, they all have the same perimeter.
- The square has the largest area.

Activity 10

Question 1

- Paddock 1 would be divided across.
- 41 metres of fencing would be used to divide it.
- Paddock 2 could be divided either across or down.
- 60 metres would be used to divide it.

- Paddock 1 uses the least amount of fencing.
- Paddocks should be long and narrow if you plan to divide them with temporary fencing often.

Question 2

- Option 1 would use 1120 metres of fencing.
- Option 2 would use 1680 metres of fencing.
- He should use option 1 if minimising the length of the fence is the only factor.

Farm Management and Leadership

Numeracy
Level 2

Support Materials for Agricultural Training

Acknowledgments

These units were developed as an initiative of the Victorian Farmers Federation and Primary Skills Victoria. They have been written and prepared by Kangan Batman TAFE.

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Published and distributed by:
The Language Australia National Resource Centre
Language Australia
GPO Box 372F, Melbourne Victoria 3001
Telephone: (03) 9926 4779
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Funded under the Workplace English Language and Literacy Programme by the Commonwealth through the Department of Employment, Education, Training and Youth Affairs.

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Introduction

Welcome to this unit of the SMAT materials, *Farm Management and Leadership 2 - Numeracy.*

SMAT stands for Support Materials for Agricultural Training. SMAT will help you improve your written and spoken communication skills and your numeracy skills, so you can succeed at training programs or communicate more successfully in your workplace.

Where this fits

SMAT has four topics: *Agricultural Production, Farmers as Employers, Farm Management and Leadership* and *Occupational Health and Safety.*

This unit is Level 2 of *Farm Management and Leadership* - Numeracy. There are three units of Farm Management and Leadership - Numeracy: Level 1 (starting), 2 (continuing) and 3 (completing). Each unit has two parts: Communication Skills and Numeracy.

After you finish this unit, you could try the other units at the same level: *Agricultural Production 2 - Numeracy, Farmers as Employers 2 - Numeracy, Occupational Health and Safety 2 - Numeracy.*

Then you could try the units at a higher level.

You do not have to complete every unit in SMAT. It is up to you to choose the most useful parts and work through them.

How to use these materials

You can use the SMAT materials by yourself, with someone to help you, or in a group or class. It is hard to work by yourself, so it is a good idea to have someone who can give you advice and feedback (a mentor). This person could be a trainer from a college or community centre, a relative, a neighbour or a friend.

The unit is written so you can start at the beginning and work through it. Or if you like you can choose parts of the unit and only do those parts. Spend more time on the parts which are most useful for you. If something is not useful, you can skip it.

There is no certificate to go with the SMAT materials. But SMAT helps you improve your skills so you can do other courses and get other certificates. For example: Farm$mart, Rural Business Management, and courses run by the Department of Natural Resources and Environment. You will also find that working through SMAT improves the communication and numeracy skills that you need in your working life.

Outcomes

After you finish the SMAT materials you will be able to communicate more effectively in speech and writing and use numeracy skills more effectively. You will be able to verify invoices, calculate farm costs and comapre those with income.

How long should I spend?

This depends on you. The amount of time will be different if you are working by yourself or in a group, with a mentor or without, and if you do all the activities or not. Take enough time to do all the activities that are relevant to you, to a standard high enough to satisfy you.

Activities

Each unit has a number of activities for you to do. In the communications units there are four types of activities:

- key word activities
- reading activities
- writing activities
- spoken communication activities.

In the numeracy units there are numeracy activities.

Sometimes you can write answers to these activities in the book. Sometimes it is better to write them in a notebook. Sometimes for the spoken communication activities you will need to go and speak to some other people.

In some places there are also practice writing and practice reading activities. These are extra activities. You can choose to do them if you think you want extra practice in something.

Most of the activities have model answers in the back of the book. You can also ask your mentor to check your answers.

What you need

Before you start, make sure you have the following:

- a notebook (A4 size is best)
- pens, pencils, highlighter pens
- a file or folder to keep extra papers.

Assessment

There is no formal assessment for SMAT. But it is a good idea to have a mentor look at what you have done. That way you can decide together what you have learned and what you need to improve.

Remember, the SMAT materials are a resource for you to use to improve your skills. It is up to you how you use them and how much of them you use.

Budgets

Often a bank will require farmers to present a budget when they apply for a loan. Here is a recent newspaper article.

Page 2

GOOD BUDGETING BRINGS REWARDS

Things have never looked so good for Hamilton dairy farmers Patrick and Jean Hayes. Good budgeting has allowed the young couple to save enough spare capital to buy a computer, install an above-ground pool for their two young children and have enough leftover capital for a holiday on the Gold Coast.

Five years ago the couple applied for a $100 000 bank loan for some much needed farm equipment and to improve the breeding stock of their herd. Their bank agreed on the condition that the couple drew up a stringent five-year budget.

Using their experience of eight years on the farm, the couple drew up a budget that took account of the expected good and bad years ahead. They also factored in a small amount of savings for each of the five years ahead.

They must have done their homework because every year came in on budget and the accumulated savings have been the icing on the cake.

"Having a computer will mean we'll not only be able to better manage the farm finances, but all farm operations, including stock and feed control," says Mr Hayes.

Mrs Hayes says they are looking forward to their two-week trip to the Gold Coast because they haven't had a holiday since getting married eight years ago. "The kids are coming too, but we've got to get them out of the pool first," she says.

Good budgeting plays a key role in successful farming by allowing for both the good and the bad years that inevitably lie ahead. And it also can bring unexpected rewards, as the Hayes have shown.

budget

income	*the money gained from your work* *It can be gross income (total money gained without compulsory deductions eg. tax or net income (total money remaining after ccompulsory deductions)*
expenditure	*costs or charges (money that you pay out)*

Determining income

When you are working out a budget, you need to record your income against your expenditure so that you see where your money is going.

Income on the farm, comes mainly from two sources:

- product sales
- livestock sales.

For example, a dairy farm sells milk and surplus cows, a piggery sells pigs for pork and bacon and also sells culled stock.

Income may also come from off farm sources such as, contracting other employment, investments etc.

Expenditure is what farmers spend to make the income. Some expenditure is common to all farmers such as machinery costs and living expenses. Other expenditures are more specific such as animal costs and seed costs.

Marjorie and Bill Spencer own a crop and sheep farm in the Wimmera. They have 1865 merino sheep and plant 1260 hectares of crop.

Listing costs

They prepare a budget each year. They:

- make a list of where their income comes from first
- write down what they think their income will be.

They use last year's payment advice sheets to give them an idea of what they will earn this year.

Income

This is Marjorie and Bill's predicted income.

Income	**$**
Wool	53 880
Sheep trading	16 391
Oats	8 400
Triticale	30 800
Wheat	195 966
Total	

Activity 1

1. Study the above table. What is Marjorie and Bill's total income?

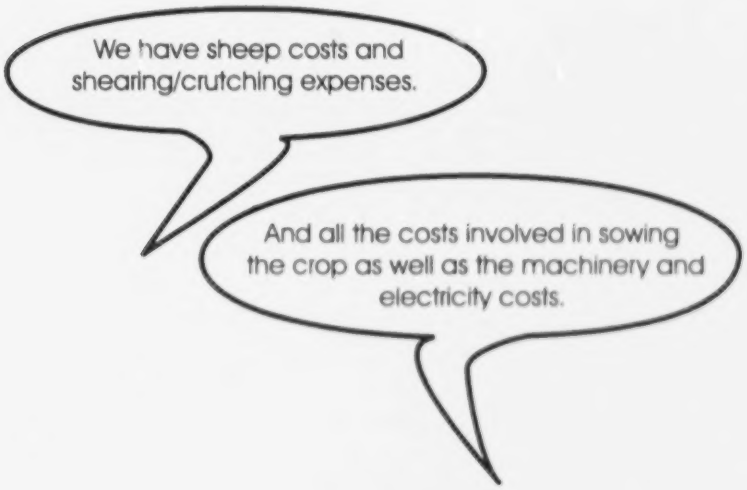
.....

2. Where does your income comes from? List the produce sold off your farm. Estimate the income from each commodity for this year and write the figures in the following table.

Produce	$

Costs

Then list all the areas where Marjorie and Bill spend money.


We have sheep costs and shearing/crutching expenses.
And all the costs involved in sowing the crop as well as the machinery and electricity costs.

Activity 2

What costs do you have? List them.

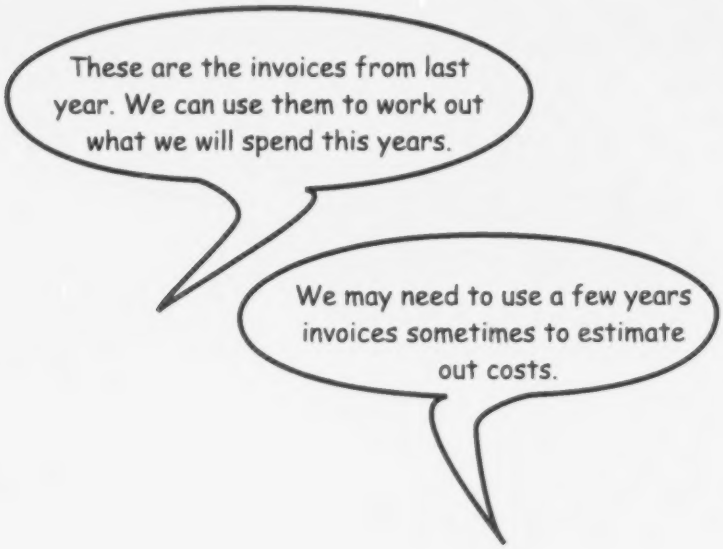
Grouping costs

Marjorie and Bill have organised their costs into groups. This helps them think about all the costs involved. This is their list.

Livestock costs	Wool costs	Crop costs
Animal health	Freight	Seed bed preparation
Supplementary feed	Wool tax	Seed
Stock selling expenses	Wool selling expenses	Fertiliser
	Shearing and crutching	Chemicals
		Fuel
		Machinery Maintenance

Overhead costs	Living costs	Capital costs
Labour	Food	Repayments on loans
Administration	Clothing	Building a new shed
Rates	Household utilities	
Vehicle registration and insurance	Entertainment	
	School expenses	
Repairs and maintenance		

They then draw up a table and write costs against them. They make an estimate from the costs they had last year.


These are the invoices from last year. We can use them to work out what we will spend this years.
We may need to use a few years invoices sometimes to estimate out costs.

Averaging invoices

Why do you need to use more than one year to work out your costs?

You may want to use more than one year's figures for working out your costs because each year has been different or last year wasn't a normal year.

Calculating the average is described in *Agricultural Production 1 - Numeracy*.

Think of reasons why you may want to use more than one year's figures.

Marjorie and Bill put all the invoices for the same things together.

Activity 3

1. Here are some copies of the receipts they have. Add up the total Marjorie and Bill spent on machinery.

FARMING PARTS LTD.

AGENTS FOR MITSUBISHI DIAMOND WHITE TRACTORS
MASSEY MOWERS MCCULLOCH CHAINSAWS

2/4 Digital Drive MOE VIC 3111
Phone 1231 12311

INVOICE 000112

SOLD TO Mr W SPENCER

29-5-1917 JOB No. ORDER No.

MAKE	Case	Req. No.	DEPT.	PRICE	$	¢
	Supply					
1	A 71102	gasket			5	20
1	19812446C1	"			5	45
5	A168912	pins			19	50
		freight			5	00
6	A41917	washer			6	90
6	5339-401	inj washers			4	80
1		iron tube			35	65
1	197726C1	breather			16	53
1	221-91	bushing			2	78
		freight			2	00
		2½ lb Rd2 gap			16	09
					# 295	90
		Labour			103	40
					499	30

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INVOICE 00015

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29-5 1917 JOB No. ORDER No.

MAKE	Case	Req. No.	DEPT.	PRICE	$	¢
	Supplies					
2	A81314C1	plate			37	80
1	A182546	gasket			5	60
1	A62114	"			10	30
1	A46286	Kit			187	15
6		ex bolts			29	70
6	380-2864	Bolts			32	70
6	A62543	bearing			88	50
6	3831212	pins			1	50
1	BL210ZNR	bearing			66	85
1	BL211ZNR	"			82	00
					# 833	10
		Labour			368	50
					$ 1251	60

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INVOICE 00018

SOLD TO Mr: W. SPENCER

29-5-1997 JOB No. ORDER No.

MAKE	Case	Reg. No.	DEPT.	PRICE	$	¢
	Supply					
1	A155116	gasket			15	90
2	E62228	belts			20	90
		freight			20	00
1	A43347	bowl			2	35
3	H560	hose clamps			8	55
		gasket material				85
1	H510	hose clamp			1	70
1	MH4	"			1	55
1	E65287	belt			10	50
1	2L1091	belt			20	45
					#	102 75

FARMING PARTS LTD.

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Phone 1231 12311

INVOICE 00025

SOLD TO Mr: W SPENCER

29-5-1997 JOB No. ORDER No.

MAKE	Case 2470B	Reg. No.	DEPT.	PRICE	$	¢
	To					
		Remove injector + test + replace				
		Replace engine fitting new torque				
		limiter plates. Assemble +				
		start Test trans pressures				
		Watch				
	Supply					
		Parts			$1437	65

FARMING PARTS LTD.

2/4 Digital Drive MOE VIC 3111
Phone 1231 12311

INVOICE 00022

SOLD TO Mr: W SPENCER

29-5-1997 JOB No. ORDER No.

MAKE	Case	Reg. No.	DEPT.	PRICE	$	¢
	Supply					
1	A66110	gasket			2	80
3	A58077	bearing			29	70
6	A58413	"			11	40
1	A50421	seal			5	50
1	A37558	"			5	70
4	A58384	ring			49	20
1	H147755	race			2	20
1	A54022	race			4	60
1	A63109	bearing			44	80
					$	155 90

BEST COPY AVAILABLE

2. Because the machinery costs have varied so much over the years, Marjorie and Bill decide to find the average cost for the last 5 years and use that figure as their estimate. Listed below are the costs for the last five years:

Year	**$**
1997	11 730
1996	10 150
1995	11 230
1994	8 490
1993	9 630
Total	

Find the average.

Total costs for 5 years =

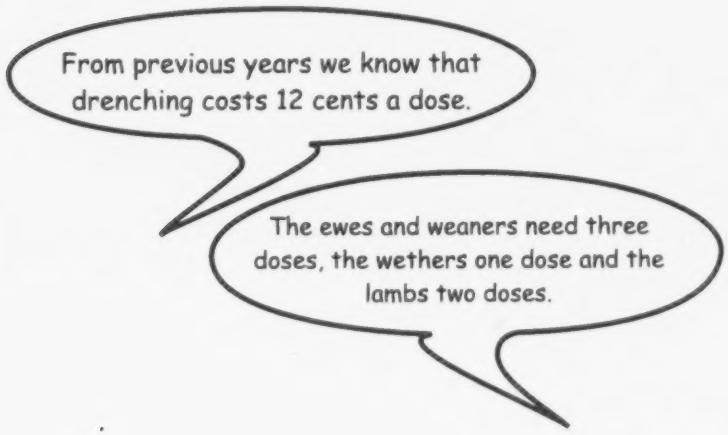
No. of years =

Average =

total costs divided by the no. years =

Predetermined costs

Sometimes Marjorie and Bill can use other information to calculate their costs.


From previous years we know that drenching costs 12 cents a dose.
The ewes and weaners need three doses, the wethers one dose and the lambs two doses.

Activity 4

How will they calculate the cost of drenching?

They have 1000 ewes, 850 weaners and 850 lambs. Calculate the total cost of drenching. The first sum has been done for you.

Ewes	1000 sheep x 3 doses x $0.12	$360
Weaners		$
Lambs		$
Total		**$**

Crop costs

Some of the crop costs are worked out by this method. When Marjorie and Bill chisel plough the fields before sowing they know that the chisel plough can do 5.6 ha/hr and the cost is $20.31 per hour. They need a total cost for the chisel plough. Let's look at their costs.

Chisel plough	2 times at 5.6 ha/hr	@ $20.31 per hour
	(for oats and triticale)	
	6 times at 5.6 ha/hr	@ $20.31 per hour
	(wheat)	

Marjorie and Bill plan to plant 140 hectares of oats, 320 hectares of triticale and 800 hectares of wheat.

They first need to calculate the time it takes to plough once. They do this by dividing the hectares by the number of hectares that can be ploughed in an hour. Oats will take 25 hours to plough once because 140 hectares ÷ 5.6 ha/hr is 25.

A paddock that will be planted with oats needs to be ploughed two times. It will take 50 hours to plough the paddock twice. The total time is then multiplied by the hourly rate. So for oats it will be 50 x $20.31 which is $1015.50.

Activity 5

Complete the following table using the information you have from Marjorie and Bill's property:

Crop	Hectares	Time taken to plough paddock once	Total ploughing time	Cost
wheat				
oats	140	140 ÷ 5.6 = 25 hours	2 × 25 = 50	50 × 20.31 = 1015.50
triticale				
Total cost				

It is also possible to calculate the fertiliser like this too.

Wheat uses 80 kg/ha of Urea at $463 per tonne, 80 kg/ha of double super 2.5% Zinc at $400 and Urea pre-drill costs are $3.33 per hectare. Oats and triticale uses 55kg/ha of MAP at $471 per tonne.

Activity 6

1. Complete the following table. The first entry has been done for you. Work out the total fertiliser costs.

Crop/ fertiliser	**Hectares**	**Total kilograms fertiliser**	**Total tonnes of fertiliser**	**Cost**
wheat-Urea				
wheat-double fertiliser				
oats	140	140 × 55 = 7700	7700 ÷ 1000 = 7.7	7.7 × 471 = $3626.70
triticale				
Total				

Using formulae

formulae

formula — *is a general rule used to find answers, for example, the formula for the area of a rectangle is A = L x W (Area = Length x Width)*

formulae — *the plural of formula*

Sometimes costs can be worked out from formulae.

The cost of post sowing herbicides can be worked out from the formula:

L/ha x ha x $/L = total cost of herbicides.

Here L/ha is litres per hectare and $/L is cost per litre.

By reading the label on the herbicide you can find out how many litres per hectare you require. In some instances Roundup is sprayed at 1.2 L per hectare. If you were spraying Roundup on the hectares that were sown with wheat you would need 1.2 L/ha x 800 ha x $11.50 /L = $11 040.

Listing costs

Marjorie and Bill fine tuned their fertilzer plans and then worked out the rest of the costs. Listed below are the costs:

Costs

Livestock costs

Animal health	$ 2026
Supplementary feed	$ 9655
Stock selling expenses	$ 865

Wool costs

Freight	$ 802
Wool tax 4% of 53880	$ 2155
Wool selling expenses	$ 2452
Shearing and crutching	$ 9446

Crop costs

Seed bed preparation

Chisel plough	wheat	$ 5 500
	oats	$ 840
	triticale	$ 2100

Seed

Triticale	$ 2700

Fertiliser

Triticale and oats	$10 920
wheat	$54 000

Pre-sowing herbicide to control			
Grass and broadleaf weeds			$ 3750
application/incorporation			$ 1500
Sowing			
Air seeder			$ 3780
Post sowing herbicides			
Broadleaf weeds			$ 1680
Capeweed, thistles, legumes, skeleton weeds application			$24150
Harvesting			
SP Harvester			$ 8820
Insurance			
Cartage to Silo	oats		$ 240
	triticale		$ 592
	wheat	$ 6678	
Overhead costs			
Labour			$25 920
Administration			$ 3520
Rates			$ 1800
Vehicle registration and insurance			$20 000
Repairs and maintenance			$10 246
Loan repayments			$26 393
Living expenses			
Clothing			$ 3500
Household utilities (gas, electricity)			$ 1957
Entertainment			$ 2000
School expenses			$ 5000
Food			$ 7820

Activity 7

1. What are the total costs on Marjorie and Bills farm? Use this list to create your own budget and put prices against your costs.

2. What are the total costs of your farm?

3. Are your costs more than your income?

4. What effect will this have?

Comparing costs to income

income

gross margins	*the difference between income and costs*
cost minimisation	*is an individual's plan to reduce costs*
cash flow	*the amount of money that is gained compared with the amount of money that must be paid out*

Marjorie and Bill compare their income to their costs. The difference between the income and the costs from the farm are called gross margins. These costs do not include living expenses. If the costs are bigger than the income then the gross margin is negative. In this case the costs are less than the income. Marjorie and Bill have money left over to use in other areas on the farm.

Having set out the budget in this way they can talk about reducing some of the costs. This is called cost minimisation. By leaving the stubble on the paddock after harvesting they may be able to save tillage and herbicide costs. Zero tillage is also environmentally friendly. This practice is already widely practiced in Victoria.

Bill and Marjorie also prepare a monthly budget to show them when and how receipts come in and payments go out. This is called the cash flow budget.

They also may choose to lease some of their land or become more diversified.

Marjorie and Bill can now investigate various practices.

Activity 8

1. Can you think of some changes you could make on your farm?

2. How much do you think these changes would save or cost you?

Model answers

Activity 1

1. Total income = $305 437

Activity 3

1. The invoices add up to $3447.20
2. Total costs for 5 years = 51 230

   No. of years = 5

   Average = total costs/no. years = 51 230 ÷ 5 = 10 246

Activity 4

Ewes	1000 sheep x 3 doses x $0.12	$ 360
Weaners	850 sheep x 3 doses x $0.12	$ 306
Lambs	850 sheep x 2 doses x $0.12	$ 204
Total		**$ 870**

Activity 5

Crop	**ha**	**time taken to plough paddock once**	**total ploughing time.**	**cost**
wheat	800	800 ÷ 5.6 = 142.9 hours	142.9 x 6 = 857.4	857.4 x 20.31 = $17 413.79
oats	140	140 ÷ 5.6 = 25 hours	2 x 25 = 50	50 x 20.31 = $1015.50
triticale	320	320 ÷ 5.6 = 57.1 hours	57.1 x 2 = 114.2	114.2 x 20.31 = $2319.40
Total cost				**$20 748.69**

Activity 6

Question 1

Crop/ fertiliser	Hectares	Total kilograms fertiliser	Total tonnes of fertiliser	Cost
wheat-Urea	800	800 x 80 = 64 000	64 000 ÷ 1000 = 64t	64 t x $463 = $29 632
wheat-double fertiliser	800	800 x 80 = 64 000	64 000 ÷ 1000 = 64t	64 t x $400 = $25 600
oats	140	140 x 55 = 7700	7700 ÷ 1000 = 7.7t	7.7t x $471 = $3626.70
triticale	320	320 x 55 = 17 600	17 600 ÷ 1000 = 17.6t	17.6t x $471 = $8289.60
Total				**$69 811.91***

* including pre-drill costs

wheat Urea (pre drill costs)

800 ha @ 3.33 = 2664.00

Total = 69812.30

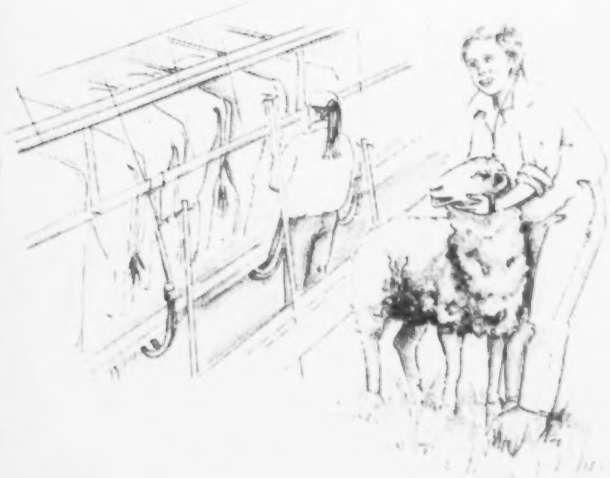
Activity 7

1. Total costs are $262 807

Farm Management and Leadership

Numeracy

Level 3



Support Materials for Agricultural Training

Acknowledgments

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Published and distributed by:
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GPO Box 372F, Melbourne Victoria 3001
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Funded under the Workplace English Language and Literacy Programme by the Commonwealth through the Department of Employment, Education, Training and Youth Affairs.

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Introduction

Welcome to this unit of the SMAT materials, *Farm Management and Leadership 3 - Numeracy*.

SMAT stands for Support Materials for Agricultural Training. SMAT will help you improve your written and spoken communication skills and your numeracy skills, so you can succeed at training programs or communicate more successfully in your workplace.

Where this fits

SMAT has four contexts: *Agricultural Production, Farmers as Employers, Farm Management and Leadership* and *Occupational Health and Safety*.

This unit is Level 3 *of Farm Management and Leadership 3 - Numeracy*. There are three units of *Farm Management and Leadership 3 - Numeracy*: Level 1 (starting), 2 (continuing) and 3 (completing). Each unit has two parts: Communication Skills and Numeracy.

After you finish this unit, you could try the other units at the same level: *Agricultural Production 3 - Numeracy, Farmers as Employers 3 - Numeracy, Occupational Health and Safety 3 - Numeracy*.

You do not have to complete every unit in SMAT. It is up to you to choose the most useful parts and work through them.

How to use these materials

You can use the SMAT materials by yourself, with someone to help you, or in a group or class. It is hard to work by yourself, so it is a good idea to have someone who can give you advice and feedback (a mentor). This person could be a trainer from a college or community centre, a relative, a neighbour or a friend.

The unit is written so you can start at the beginning and work through it. Or if you like you can choose parts of the unit and only do those parts. Spend more time on the parts which are most useful for you. If something is not useful, you can skip it.

There is no certificate to go with the SMAT materials. But SMAT helps you improve your skills so you can do other courses and get other certificates. For example: FarmSmart, Rural Business Management, and courses run by the Department of Natural Resources and Environment. You will also find that working through SMAT improves the communication and numeracy skills that you need in your working life.

Outcomes

After you finish the SMAT materials you will be able to communicate more effectively in speech and writing and use numeracy skills more effectively. You will be able to calculate the area of a triangle, square-off accurately and calculate the volume of cubes, cylinders and other shapes.

How long should I spend?

This depends on you. The amount of time will be different if you are working by yourself or in a group, with a mentor or without, and if you do all the activities or not. Take enough time to do all the activities that are relevant to you, to a standard high enough to satisfy you.

Activities

Each unit has a number of activities for you to do. In the communications units there are four types of activities:

- key word activities
- reading activities
- writing activities

- spoken communication activities.

In the numeracy units there are numeracy activities.

Sometimes you can write answers to these activities in the book. Sometimes it is better to write them in a notebook. Sometimes for the spoken communication activities you will need to go and speak to some other people.

In some places there are also practice writing and practice reading activities. These are extra activities. You can choose to do them if you think you want extra practice in something.

Most of the activities have model answers in the back of the book. You can also ask your mentor to check your answers.

What you need

Before you start, make sure you have the following:

- a notebook (A4 size is best)
- pens, pencils, highlighter pens
- a file or folder to keep extra papers.

Assessment

There is no formal assessment for SMAT. But it is a good idea to have a mentor look at what you have done. That way you can decide together what you have learned and what you need to improve.

Remember, the SMAT materials are a resource for you to use to improve your skills. It is up to you how you use them and how much of them you use.

Measuring

If you want to run your farm efficiently and not waste money you need to make clear decisions based on accurate information.

You must measure and calculate accurately when you:

- predict resource usage
- order materials
- make management decisions.

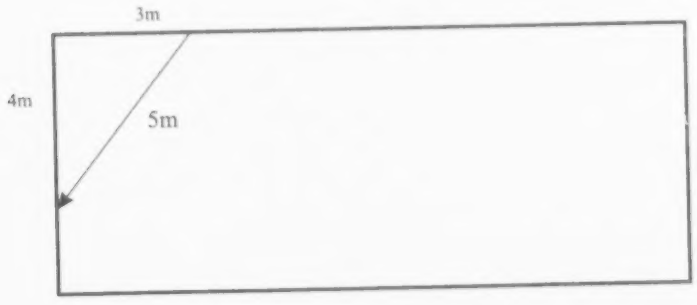
It is important to be as accurate as possible when measuring because inaccuracy may mean you over or under order resouces.

For example, if you are inaccurate in measuing the concrete needed for a shed extension by as much as 20cms you could over order or under order by as much as 2 to 3 cubic metres.

Squaring off is an important way of making sure you don't waste resources. It is sometimes necessary to square off corners.

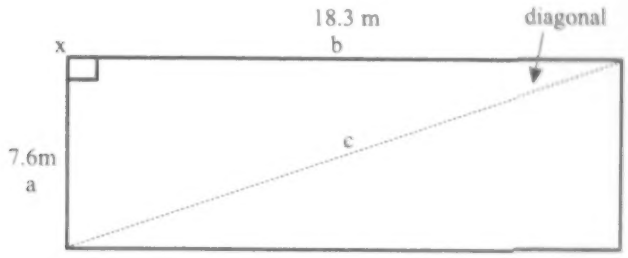
Ruth wants to put up a new machinery shed. She needs to square off the corners. She wants a 18.3m x 7.6m x 2.45m (60' by 25' by 8') shed. She needs to pour a concrete floor first. She wants to make a rectangular box to pour the concrete into. Ruth needs the box to have right angle corners (squared off).

She could do this by pegging out the known right angled triangle of 3:4:5 with string, where 3 metres and 4 metres are the length of the sides and 5 metres is the diagonal as shown.



However when making a long thin rectangle, it is more accurate to find the length of the diagonal.

Ruth runs a piece of string this length from one side of the rectangle to the other as shown.



Ruth uses the Pythagoras theorem for right angle (90°) triangles to find the length of the diagonal.

The formula for this theorem is:

$a^2 + b^2 = c^2$

where c is the longest side (called the hypotenuse) of the triangle, and a and b are the other two sides.

For any rectangle, the hypotenuse is the diagonal. Ruth needs to find this length. She knows the length of the other two sides.

Putting the values into the formula, she calculates the hypotenuse:

$c^2 = 7.6^2 + 18.3^2 = 57.76 + 334.89 = 392.65$

Remember that 7.6^2 means 7.6 x 7.6 and 18.3^2 means 18.3 x 18.3

that is c^2 (the hypotenuse^2) = 392.65

To find the length of the hypotenuse c (the diagonal), it is necessary to find the square root of 392.65 on your calculator. The square root will usually be shown on the calculator as:

so

$c^2 = 392.65$

and $c = \sqrt{a^2 + b^2} = 19.815398$ m (19.815398 x 19.815398 = 392.65)

The diagonal of the rectangle is 19.815 m long rounding off. Ruth runs a piece of string 19.815 metres diagonally long across the rectangle. When side a is measured at 7.6m, side b at 18.3m and the diagnonal c is 19.815m there is a right angle at point x.

The rectangle is now square. The rectangle now has a right angle at point x.

Other diagonals can easily be checked to make sure the other corners are also right angled.

Squaring and square root

To find the square of a number it is multiplied by itself. The product (or answer) of the multiplication is called the square.

For example, 2 x 2 = 4

therefore $2^2 = 4$.

3 x 3 = 9

$3^2 = 9$.

The square of 2 is 4.

The square of 3 is 9.

Finding the square root is the opposite operation of finding the square. To find the square root of a number use your calculator or find it in a set of square root tables.

For example, $4 \div 2 = 2$

$c = \sqrt{a^2 + b^2}$

$9 \div 3 = 3$

$c = \sqrt{a^2 + b^2}$

The square root of 4 is 2.

The square root of 9 is 3.

Activity 1

Try these examples

1. Use this formula to check that a building or small yard that you have is laid out square. Measure the length and width of the rectangle. Calculate the length of the diagonal (hypotenuse). It should be in a right angled triangle. Compare this with the actual measurement.

   Remember the formula for right angled triangles:

   $c^2 = a^2 + b^2$

   for the hypotenuse (or diagonal)

   $c = \sqrt{a^2 + b^2}$

   $c^2 = \ldots\ldots^2 + \ldots\ldots^2$

   $c^2 = \ldots\ldots + \ldots\ldots$

   Answer $c^2 = \ldots\ldots$

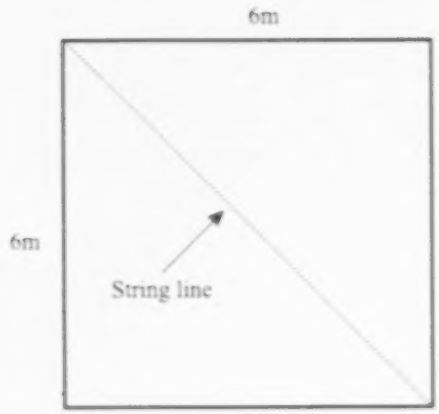
   $c^2 = \sqrt{a^2 + b^2}$

   $c^2 = \sqrt{\ldots\ldots + \ldots\ldots}$

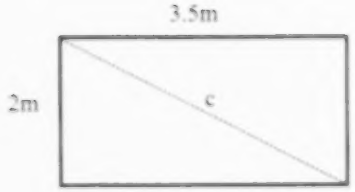
   $c = \ldots\ldots$

   Answer $c = \ldots\ldots$

2. Michael is adding on to his sheepyards. He wants to add a pen that is 6 metres by 6 metres. How long is the string line if the sides are at right angles?



3. Helen is erecting a foal crib. It is 2 metres by 3.5 metres. How long is the diagonal if the sides are squared off (that is the sides are at right angles)



4. Jo wants to concrete more of her dairy run. She plans to add on an additional 100 metres. If the run is 3 metres wide calculate the length of the diagonal.

Volume

Ruth also needs to calculate other measurements. She sometimes needs some volume formulae.

An example of when she needed this was when Ruth was offered some wheat at a cheap rate. She needed to build a temporary silo to store the wheat. If the silo she built was too large she would have paid for materials she did not use. If the silo she built was too small she would not be able to store all the cheap grain.

It is important that she calculate her measurements accurately. By calculating accurately Ruth will make sure that she is cost effective in her planning and use of resources.

When she works out the volume of a feed trough she uses the formula for a prism (or parallel sided shape). She multiplies the area of the base by the height.

Area of base = $l \times u$

For example the volume of a rectangular prism (or brick shape) is:

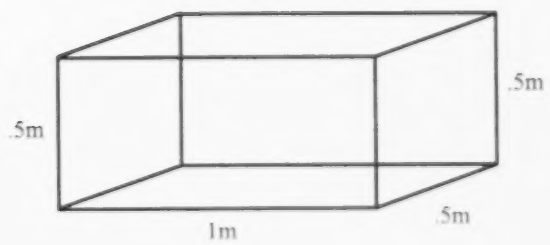
Area of base x width

Area of base = length x width

so volume = area of base x height

= length (l) x width (u) x height (h).

$A = l \times u \times h$



To find volume of this prism (brick shape) Ruth multiplies the length by the width by the height.

The volume of the prism (brick shape) is .5 x .5 x 1 = .25m^3 = cubic metres.

The length of the diagonal is found by the following calculation:

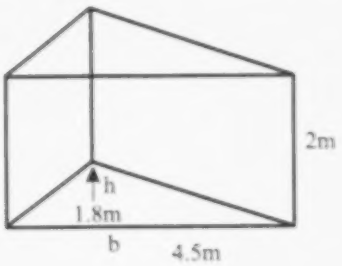
$3^2 + 100^2 = \quad 9 + 10000 = \quad 10009 = 100.04$m

The diagonal is 100.04 metres long.

Activity 2

Find the volume of the following shapes.

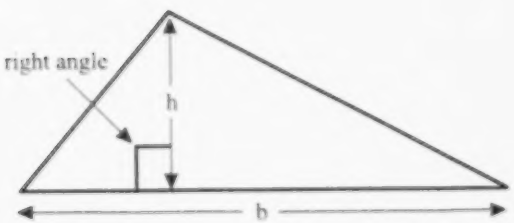
1. Triangular Prism (shape of piece of cake)



The formula for the area of a triangle is:

$A = \frac{1}{2} b \times h$

where the h is the altitude or perpendicular height of the triangle.



Area of triangular base = $\frac{1}{2} b \times h$

= $\frac{1}{2} bh$

Answer = ...

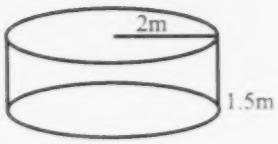
Volume of triangular prism

= Area of base of the triangle x height of the prism

= ..... x .....

Answer =

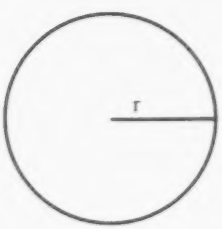
2. Cylinder



The formula for the area of a circle is:

$A = \pi r^2$

where r is the radius of the circle and π is 3.14.



Volume of cylinder

Area of base x height

Area of base (circle) = πr^2

= 3.14 x 2^2

= 3.14 x .....

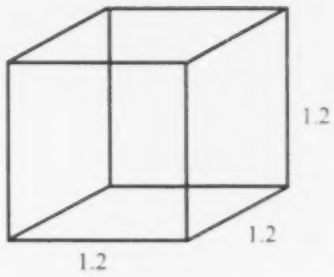
Answer = ...

Volume = Area of base x height

= ..... x .....

Answer = ...

3. Cube



The formula for the area of a square is:

A = *l* x *l*

$A = l^2$

where *l* is the length.

Volume = Area of base x height

Area = *l* x *l* (or l^2)

= ..... x .....

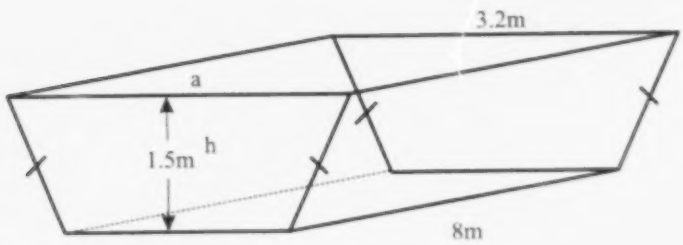
Answer = ...

Volume = *l* x *l* x *l* (or l^3)

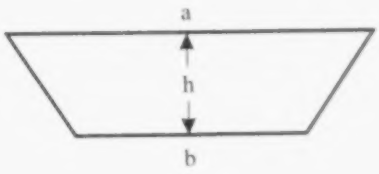
= ..... x ..... x .....

Answer = ...

Not all shapes are regular. Sometimes shapes that we need to find the volume for are more unusual. Here is one example.



The area of the end of this shape can be found by using the formula for the area of a trapezium. The formula for the area of a trapezium is $(\frac{a+b}{2})h$ where a, b and h are:



The volume of the trapezium is:

$(\frac{2.4 + 3.2}{2}) \times 1.5 \times 8 = 33.6m^3$

Practical applications of volume formulae

Ruth uses these volume formulae for ordering materials, working out construction sizes or for finding the amount of litres in a container.

For example, Ruth wants to know how many cubic metres of cement she needs to make the dairy run from activity 1 number 4. Ruth lays the concrete 10 cm thick. The volume of concrete is worked out using the volume formula for rectangular prisms l x w x h .

Figure 1:

Before Ruth can do this, she needs to convert all the units to the same measurement. The 10 centimetres (10cm) need to be converted to metres.

For more information on conversions see *Agricultural Production 1 - Numeracy*.

10 cm = 0.1 m

The volume is 100 x 3 x 0.1 = 30 m^3 (cubic metres)

Ruth needs 30 cubic metres of concrete.

(Remember to always have an estimate of the answer in your head before working it out.)

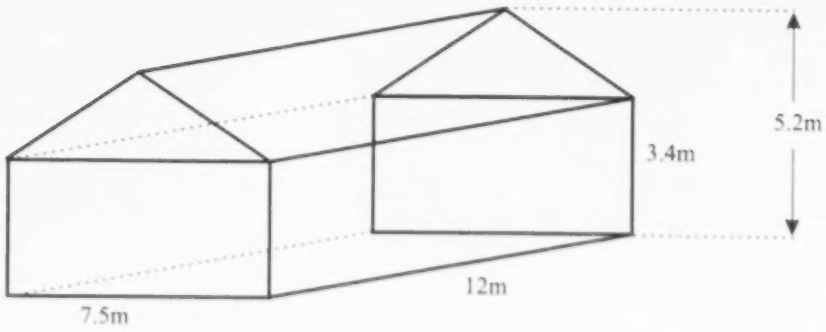
Activity 3

1. Vin is going to put gravel onto a farm track for 200m. If the track is 2.5 metres wide and the gravel is laid 15 centimetres thick, how many cubic metres of gravel does Vin need?

2. Isabel is installing a temporary silo with a circular base and a height of 3 metres and a radius of 2.5 metres. Find the volume of the silo.

3. A trench 200m long is dug beside a track. If the width at the top is 3.0m and at the bottom is 1.8m and the trench has a depth of 1.2m, find the volume of the trench.

4. Find the volume of a hay shed if the dimensions are as shown:



Note this is a combination shape. Calculate the volume of the section with the rectangular end and the volume of the section with the triangular end then add the two volumes together.

- What is the volume of a bale of hay if the dimensions are 0.9m x 0.45m x 0.45? (What shape would the base be?)

  Volume = ...

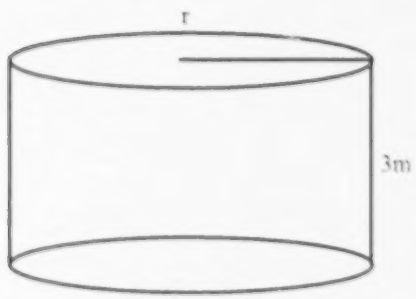
  = ... m^3

- How many bales of hay will fit into the shed, if the shed is stacked up to the beginning of the roof?

Converting weights to volumes

Ruth has been offered 60 tonnes of wheat at a cheap price if she takes it from the paddock. She needs a temporary silo to store the wheat in. Ruth plans to build the silo on a concrete floor using reinforcing mesh and shade cloth.

She can buy reinforcing mesh that is 3 metres wide. Ruth needs to calculate the length of mesh needed to hold 60 tonnes of wheat. To do this she needs to find the radius of the cylinder and then calculate the circumference.



Transforming the volume formula for a cylinder ($V = \pi r^2 h$) to $r = \sqrt{\frac{V}{\pi h}}$ she can now calculate the radius.

For example, a temporary silo with a volume of 35 cubic metres is needed. The silo will be 3 metres high. What will the radius be? What will the circumference be?

The volume of a cylinder is $v = \pi r^2 h$

The radius of the cylinder will be $r = \sqrt{\frac{V}{\pi h}}$

$v = 35$ cubic metres, $\pi = 3.14$, $h = 3$ metres

radius, $r = \sqrt{\frac{V}{\pi h}}$

$r = \sqrt{\frac{35}{3.14 \times 3}}$

$$r = \frac{35}{9.32}$$

$= 35 \div 9.32 = 3.7155$

$r = 3.7155$

$r = 1.93\text{m}$

Circumference $= 2\pi r$

$= 2 \times 3.14 \times 1.93$

$= 12.12\text{m}$

Ruth also needs to convert the wheat from tonnes to cubic metres .

She knows that 1cubic metre of wheat weighs about 740kg.

Activity 4

1. How many cubic metres will 60 tonne of wheat take up if 1m^3 (one cubic metre) contains 740kg?

2. If the volume of a cylinder is $81.08\ \text{m}^3$ and the height is 3m, find the radius using the formula $r = \frac{V}{\pi h}$.

3. If a circle has a radius of 2.93m find the circumference of the circle using the formula $C=2\pi r$.

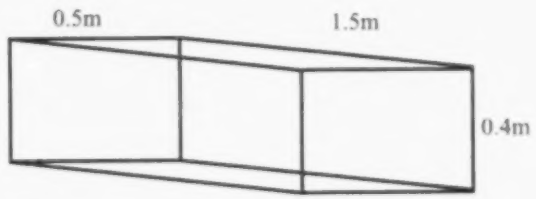
4. Ruth requires 18.41 metres of reinforcement mesh to build the temporary silo. Using the same process as above calculate the amount of mesh required if the wire is 3.5 metres wide.

5. Ruth has been offered 60 tonnes of oats instead of wheat. If 1 cubic metre of oats weighs 490kg calculate the length of reinforcing mesh that Ruth needs for a temporary silo if the mesh is 3 metres wide.

Converting, volumes to litres

Sometimes Ruth needs to know how much water a container or space will hold. She can work this out using the conversion: 1 cubic metres equals 1000 litres.

For example, Ruth plans to install a container on the back of her ute. She wants to know how many litres it will hold. Using the dimensions below:

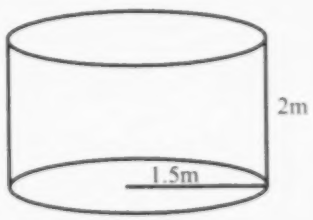


Ruth calculates the volume as 0.5 x 1.5 x 0.4 = 0.3m^3. She converts this to litres 0.3 x 1000 = 300 litres. This container will hold 300 litres.

Activity 5

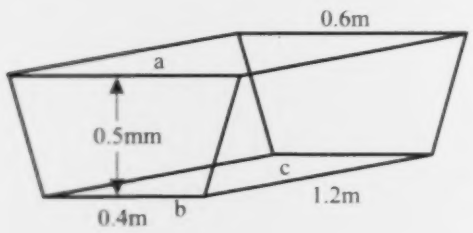
Find the litres each of the following holds:

1. A water tank whose height is 2m and has a radius of 1.5m.



$V = \pi r^2 h$

2. A water trough of the following dimensions:



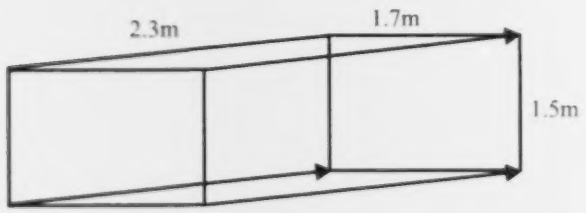
a = 0.6m

b = 0.4m

c = 1.2m

$V=(\frac{a+b}{2})hl$

3. A rectangular prism whose dimensions are:



Model answers

Activity 1

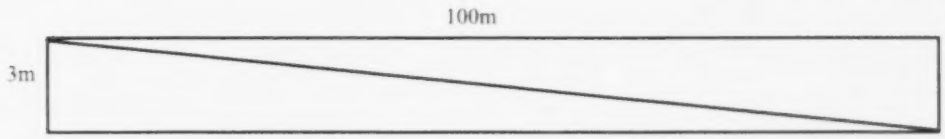
2. $6^2 + 6^2 = 36 + 36 = 72$.

   The string line is $\sqrt{72} = 8.5$m if the sides are at right angles.

3. $2^2 + 3.5^2 = 4 + 12.25 = 16.25$

   The diagonal on the foal crib is $\sqrt{16.25} = 4.03$m if the sides are at right angles.

4. a = 100m, b = 3m.



Activity 2

1. Area of base = $\frac{1}{2}$ *bh*

   = $\frac{1}{2}$ x 4.5 x 1.8 = 4.05m^2

   Volume = area of base x height

   = $\frac{1}{2}$ x 4.5 x 1.8 x 2 = 8.1 m^3

   The volume of the triangular prism is 8.1 m^3

2. Area of base = πr^2

   = 3.14 x 2^2

   = 3.14 x 4

   Area of base = 12.56m^2

   Volume = Area of base x height

   = 12.56 x 1.5

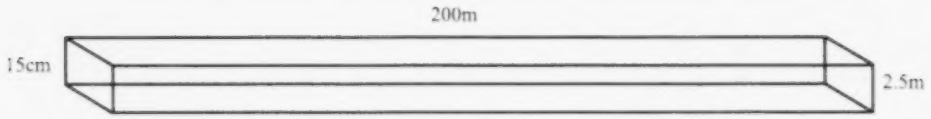
   π x 2^2 x 1.5 = 18.8 m^3

The volume of the cylinder is 18.8 m^3

3. $1.2^3 = 1.2 \times 1.2 \times 1.2 = 1.73$

Activity 3

1.



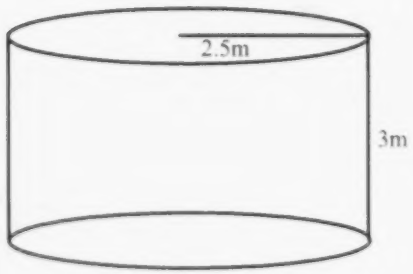
First change the 15 centimetres to metres.

15cm = 0.15m

Volume = $l \times w \times h$

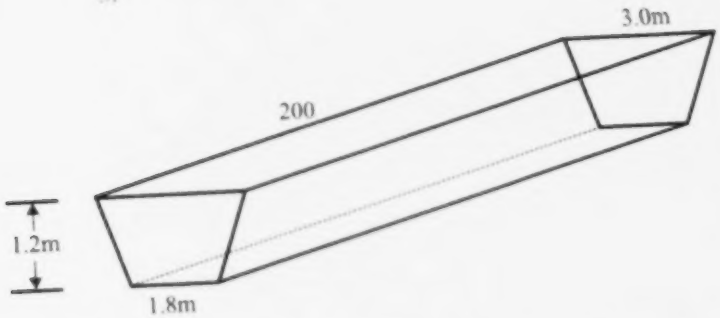
Volume = $200 \times 0.15 \times 2.5 = 75m^3$

2.



Volume = $\pi \times 2.5^2 \times 3 = 58.875m^3$
(3.14 was used as an approximation for π)

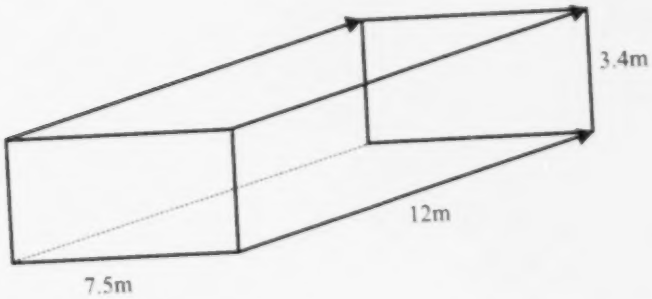
3.



The volume of the trench is

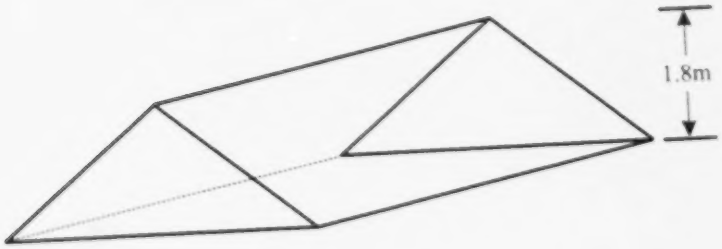
$(\frac{3.0 + 1.8}{2}) \times 1.2 \times 200 = 576m^3$

4.



Volume of the rectangle:

$V = 7.5 \times 12 \times 3.4 = 306m^3$



Volume of triangle:

$V = \frac{1}{2} \times 7.5 \times 1.8 \times 12 = 81m^3$

Total volume = $306m^3 + 81m^3 = 387\ m^3$

- The volume of a bale of hay is:

  $V = 0.9 \times 0.45 \times 0.45 = 0.18225m^3$

- The number of bales of hay that would fit into the hay shed would be:

  $306m^3 \div 0.18225m^3 = 1679$ bales.

Activity 4

1. First we need to convert the tonnes and kilograms to the same units. Both will be converted to kg:

   60 tonnes = 60 000kg

   So the volume will be:

   $60\,000 \div 740 = 81.08\ m^3$

2. $r = \frac{81.08}{3.14 \times 3} = 2.93m$ ($\pi = 3.14$ was used)

3. $C = 2 \times 3.14 \times 2.93 = 18.41m$

4. $r = \frac{81.08}{3.14 \times 3.5} = 2.72m$

   $C = 2 \times 3.14 \times 2.72 = 17.08m$

5. Volume of oats is:

   $60\,000 \div 490 = 122.45m^3$

   $r = \frac{122.45}{3.14 \times 3} = 3.61m$

   $C = 2 \times 3.14 \times 3.61 = 22.67m$

Activity 5

NOTE: 3.14 is used for the value for π in all examples.

1. $V = 3.14 \times 1.5^2 \times 2 = 14.13m^3$

   $14.13m^3 = 14.13 \times 1000 = 14\,130$ litres.

2. $V = (\frac{0.6 + 0.4}{2}) \times 0.5 \times 1.2 = 0.3m^3$

   $0.3m^3 = 0.3 \times 1000 = 300$ litres.

3. $V = 2.3 \times 1.7 \times 1.5 = 5.865m^3$

$5.865m^3 = 5.865 \times 1000 = 5865$ litres.